SKYWAYS

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Watch out for...

HIGH-SPEED STALLS

page 16

NOV. 1949 25¢

Pilot's Report...New Cessna 140 page 20

It's the "EXTRAS" that make this Beechcraft a better buy!

★ **Extra speed** — The Beechcraft Bonanza achieves its high speed *without engine overload*—170 mph cruising speed at 8,000 feet using but 56% of the maximum rated take-off power. You buy a plane to *make time*. In a Beechcraft, you *get* it!

★ **Extra ruggedness** — Beechcraft Bonanza framework is stronger than conventional construction. Shock and stress tests far surpassing CAA requirements have proved the extra ruggedness of every inch of the Beechcraft Bonanza—from landing gear to cabin roof!

★ **Extra economy** — Extra low fuel consumption of 9.5 gallons per hour at cruising is part of the Beechcraft Bonanza's operating economy. Another vital "extra" is low maintenance due to freedom from engine overload. The Beechcraft Bonanza saves your money!

★ **Extra safety** — The Beechcraft A35 Bonanza has been dived under radio control at 275 mph—and pulled out unscathed at 3 G's! On the ground, the Beechcraft Bonanza's wide tread, long wheel base, and cross-braced struts defy the roughest handling, the roughest terrain.

★ **Extra performance** — No airplane yet designed can beat the high performance of the Beechcraft Bonanza—its unexcelled combination of speed, range, and fuel economy. Its flight characteristics make it one of the easiest planes in the world to handle!

★ **Extra power** — The extra margin of power in a Beechcraft Bonanza comes from aerodynamic design which requires but 56% of the engine's power at cruising. Never before has so little power been needed for such high performance by so rugged a plane!

★ **Extra range** — The extra range you get in a Beechcraft Bonanza—750 miles—makes it *real transportation*. Equipped for long distance flight, it is the most practical of all planes for business use—with a *commercial* margin of safety, speed, and range!

★ **Extra utility** — The Beechcraft Bonanza is a business plane, engineered for extra usefulness as a business vehicle. It can be operated the year around. It can get into small, unpaved landing fields as well as modernized airports. It is ready to go—365 days a year!

★ **Extra comfort** — From the moment you step (not climb!) into a Beechcraft Bonanza through its wide, auto-type door and settle yourself in its uncrowded 4-place interior, you're conscious of superb comfort. Its sound-proofing is the standard of comparison!

★ **Extra luxury** — Skilled design and placement, with superb interior appointments, make the Beechcraft Bonanza an aerial limousine. You'll lean back and relax and enjoy air travel as never before! Its only rival for sheer luxury is the multi-engined airliner itself!

● These are only the highlights among hundreds of reasons why the Beechcraft Bonanza is a better buy! *See* it today! A note on your company letterhead will bring illustrated brochures describing the Beechcraft Bonanza's many *extra* advantages. Write to Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

Compare these performance features

- Top speed, 184 mph
- Cruising speed, 170 mph
- Range, 750 miles
- Service ceiling, 17,100 feet
- Fuel economy, 9½ gal. per hour

Compare these comfort features

- Exclusive retractable step
- Limousine entrance
- Insulated, sound-proofed cabin
- Quickly removable rear seat
- Luggage compartment accessible two ways

Beechcraft

BONANZA

MODEL A35

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

ASCINATING WORK RICH REWARDS IN AERONAUTICAL ENGINEERING

Right in this magazine, and in your daily newspaper, you see unfolding e swift, spectacular progress of *Aviation*—sensational new speed records . ever-expanding, world-wide commercial airlines... spectacular new ilitary aircraft. Right before your eyes are these thrilling achievements f *Aeronautical Engineers*—swifter, more powerful, more efficient planes . performing ever more amazing feats.

Back of the countless new aircraft and new achievements yet to ome, there must be trained engineers performing their fascinating duties, nd enjoying the rich rewards of success, personal achievement, and the rill of contributing to the great *Air Age.*

Here is a ringing challenge to the young man of imagination and mbition. Here is a career field where your talents—whether creative or ractical—can have full play. Here is the ideal combination of security, nlimited opportunity, interesting work, and good earnings.

Models and contestants in one of the frequent meets held by Northrop Model Club. Through model building, students express the expanding knowledge of aircraft design and construction acquired during their aeronautical engineering training.

THROP TRAINING HAS WON CHOICE JOBS FOR GRADUATES

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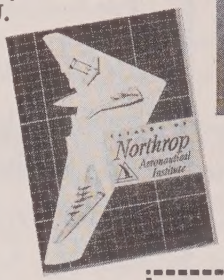
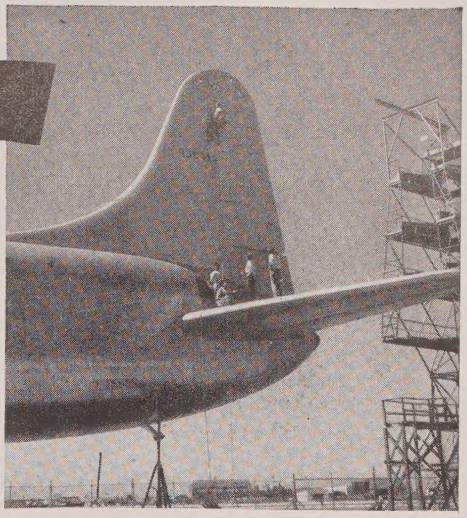
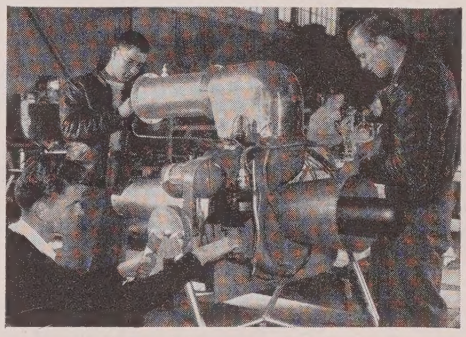
Here is detailed information on opportunities in *tion*... and a complete description of *Northrop's* 2-year *nautical Engineering* course. This big, beautifully printed klet contains many interesting photographs of Northrop es and plant scenes. Send coupon for your free copy.

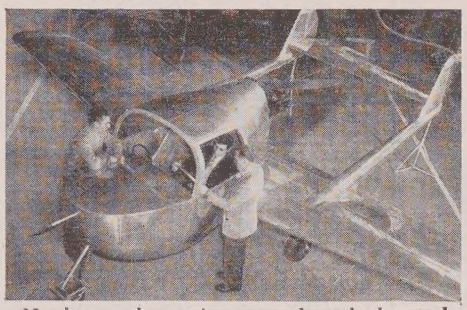




BIG JOB for engineers was inspection of completed 57-foot-high tail fin on Air Force's XC-99 Consolidated Vultee transport, world's largest land plane ...an example of the interesting and varied duties performed by aeronautical engineers.



As a practical training project, Northrop engineering students developed this lightweight turbojet aircraft engine by adapting a fighter plane turbosupercharger, the students themselves designing and building the combustion chamber, ducts, tail pipes, and electric controls.



Northrop student engineers consult on dual control arrangement for student-designed and built private plane. Complete metal mock-up shown here was fabricated and assembled by students as part of practical training project.

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Coming Up... in SKYWAYS

In between plans for a good-sized portion of Thanksgiving turkey and your hopes for "what'll I get for Christmas," how about a look-see at what's in store for you in the December issue? During the past year, we've had a lot of requests for certain articles and, as luck would have it, those request pieces have come in in time for us to pass them on to you . . . in our Christmas issue.

Here's a portion of the line-up:

● **"RAF Fighting Planes,"** This is a special section that includes pictures, performance figures and specifications of the Royal Air Force's latest front-line military aircraft. The Gloster *Meteor* . . . the DeHavilland *Vampire* . . . the Hawker P. 1052 . . . the Royal Navy's *Sea Attacker* . . . these and more than 40 other British airplanes, military and civil, are offered in pictorial detail in this Special Section.

● **"Pilot's Report: Meyers Mac,"** by *Don Downie.* Here's a two-seater that by its excellent performance alone is bound to interest and excite pilots and plane owners. Don Downie test flies the *Mac* . . . and gives us his report on how the ship handles . . . and why it's a trim little plane that is fun to fly.

● **"Jets Are Simple,"** by *Capt. Richard Creed,* USAF. In this one Capt. Creed details the reasons why it's a lot easier to fly a jet airplane than it is to handle such sleek fighters as the F-51 *Mustang.*

● **"Operations S. O. P.,"** by *Gil Close.* Any pilot who wants to be around to enjoy flying for a long time will start right out developing his own list of things he will and won't do. Called "Standard Operating Procedures," these will's and won't's are an extra measure of safety for all airmen.

● **"Pilotage—The Lost Art,"** by *Donald Chase.* It doesn't take long for a pilot, accustomed to navigating by radio, to lose his "sense of direction" by map. In this article Pilot Chase reviews the subject of pilotage and tips the airmen on how he can keep his pilotage talent sharp.

These are just a few of the features for the pilot and plane owner who makes sure he gets SKYWAYS

December Issue

SKYWAYS

Cover: Lockheed TF-80C

Arctic Research — USN .....Adm. T. C. Lonnquist, USN
Problems of Polar operation find solution in Naval Aviation operations

High-Speed Stalls .....Dana Crawford
An old pilot remembers an airplane can be stalled at any speed

Flight in a Basket .....Cmdr. Walter W. Boyd, USN
For thrills and adventure a Naval officer has a go at ballooning

Pilot's Report — Cessna 140 .....Don Downie
The new Cessna 140 passes pilot's rigid flying test with top results

On The Level .....Ben Robin
Modern planes call for new methods of judging level flight

Flying Photog .....Bob Arentz
Plane means more business to commercial photographer

Plane Care for Flight .....Bill Odom
SKYWAYS offers Capt. William P. Odom's last article for his fellow pilots

Philly Regatta .....
Photographer Hans Groenhoff records on film a new idea in air racing

New on the Wing .....
Add these planes to your today's list of all the world's aircraft

He Who Flies Backwards .....J. Wesley Neal
The flight engineer is the man who keeps his fingers on his plane's pulse

Task Force .....
Warner Brothers releases one of best films ever made on Naval Aviation

Dilbert .....Rob't Osborn & Seth Warner
Night flying leaves no margin of error in going on instruments

Air Your Views	7	Aero-Equipment	
Hangar Flying	8	Operational Engr.	
Prop Wash	9	CAP News	
Military Aviation	10	CAOA Report	

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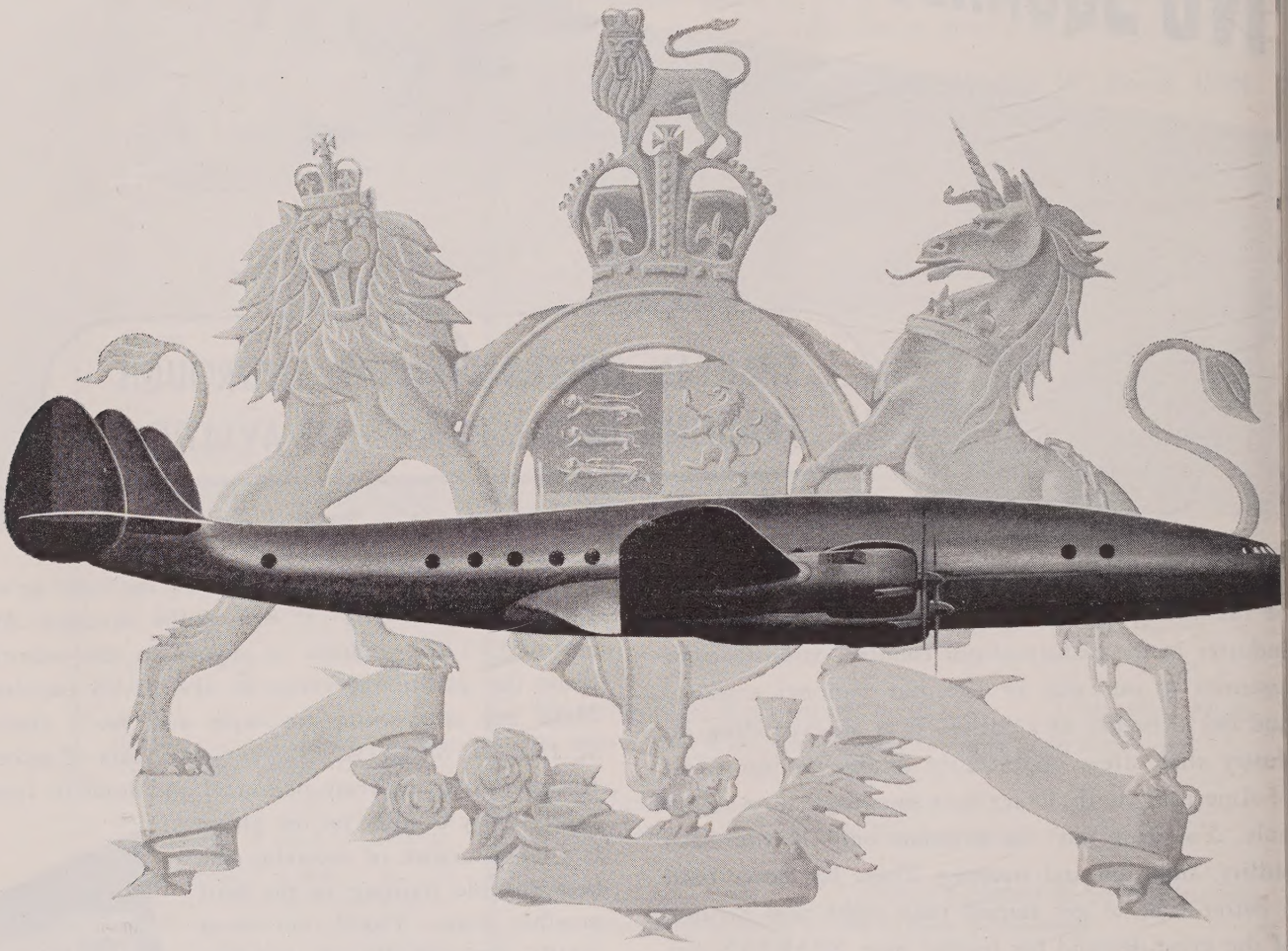
The Majestic Constellation



The newest member of the Lockheed Constellation family is the Union of South Africa. This government recently purchased a fleet of these 320-mile-an-hour transports for the South African Airways. Now, four members of the great Commonwealth of Nations fly the majestic Constellation. Australia is represented by Qantas Empire Airways, India by Air India International and the United Kingdom by the British Overseas Airways Corp., all flying the Constellation. Eight other major world airlines also fly, and many have reordered, this famous *tried and proven* airliner, still the world's most reordered four-engined transport.

LOOK TO LOCKHEED FOR LEADERSHIP

Lockheed Constellation

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AIR YOUR VIEWS

Best Fighter?

Gentlemen:

I have two questions: 1) What is the best all-'round jet fighter of the USAF? 2) Why are the letters "NC" at the beginning of a plane's license number?

RAYBURN LEE

Leetown, Kentucky

If we were to try to answer that first question, Mr. Lee, we'd be sticking our neck w-a-a-a-y out. For every jet plane in the Air Force you'll find as many pilot opinions as to which ship is the best. Let's leave it this way: each jet plane was designed to do a specific job . . . and each jet does just that. No war could ever be won with just one so-called "all 'round" fighter. It takes many fighters, each tops in its field, and the Air Force has 'em.

Question No. 2 is easy. According to Civil Air Regulations, "Aircraft identification marks shall be displayed on aircraft in the manner prescribed by the Administrator. Aircraft identification marks are as follows:

NC . . . Roman capital letters NC followed by the registration symbols shall be displayed on aircraft which fully comply with the minimum air-worthiness requirements specified in the Civil Air Regulation." A more recent amendment to that, Mr. Lee, calls for just the "N" plus the numbers, instead of the "NC." Okay?—Ed.

Info Corner

Gentlemen:

I would appreciate any information you can give me in regard to midget airplane racing: rules, regulations, or the address of the organization that sets up the rules.

HARLEY E. McVAY

Washington, Pa.

We suggest you write to the Professional Racing Pilots Association, 4434 Alta Canyado Rd. La Canada, California, for that information.—Ed.

Gentlemen:

In your August issue we noted a picture of the Johnson *Bullet* and became very interested in it. We'd appreciate your giving us the name and address of the manufacturer.

H. M. JOHNSON

O'Brien, Oregon

Write Johnson Aircraft Corporation, P. O. Box 690, Tyler, Texas.—Ed.

Gentlemen:

What is the top speed of the F-90 and the 7002 *Flying Triangle?*

S. CLINE

Raleigh, N. C.

That information is restricted at this time, and probably will be for some time to come.—Ed.

Gentlemen:

I would appreciate your sending me the correct address of the manufacturers of the Mooney *Mite.*

JACK R. GASKILL

Vallejo, Calif.

Mooney Mite is built by Mooney Aircraft, Inc., Airport P. O. Box 3012, Wichita, Kansas.—Ed.

Air Mail Stamp

Gentlemen:

I just took a close look at a six-cent air mail stamp and I'm wondering what kind of a plane it is.

PFC. M. J. HILES

Roslyn, L. I., N. Y.

The plane depicted on the Air Mail Stamps is a composite of several commercial airliner-types. It has the nose of a Douglas and the tail of a Lockheed, etc.—Ed.

Ryan Data

Gentlemen:

In your August issue, Mr. R. E. Boyd asked for data on the Ryan ST, which later became the PT. Your reply stated, in part, that the Ryan PT-22 powered by 160-hp Kinner cruises at 123 mph. I have before me the specifications and performance data on the Ryan PT-22. In it the cruising speed is given as 110 mph and the maximum speed as 125 mph. You also stated the range was 352 miles, whereas the spec sheet gives the PT-22 a cruising range of only 230 miles. I own a Ryan PT-22 and have substantiated this data over the past year and a half. I only wish the performance were as good as you say in your reply and that, as Mr. Boyd says, someone would produce a similar plane.

H. C. MACKALL
Ass't Airport Mgr.

Dayton Municipal Airport
Dayton, Ohio

Thanks, Mr. Mackall, for offering up the correction. The information we passed on also came from the manufacturer, but—we're inclined to agree that your data is more accurate.—Ed.

Cessna Airmaster

Gentlemen:

Will you give me some information on the Cessna *Airmaster*? I would like to know what years the ship was built, its horsepower and cruising speed. Also, does that instrument panel on the lower lefthand page 28 of the June issue belong to the *Airmaster?*

J. HERMAN

Bloomington, Illinois

Cessna built the Airmaster from 1937 to 1942. The 1937 (C-37), 1938 (C-38), 1939 (C-145) and 1940 (C-145) models were all powered by 145-hp Warner engines and had cruising speed of 143 mph, range of 525 miles. The Airmaster C-165, powered by 165-hp Warner engine, was built in 1939, 1940, 1941, and 1942. Cruising speed for the C-165 was 149 mph, range was 485 miles. The Airmaster line was discontinued in early '42. Yes, that is a photo of an Airmaster panel.—Ed.

Note: On the index page of the October issue, the cover was named "Lockheed TF-80C." This was an error caused by a switch in covers. It should have read, "Cover—Republic F-84E."—Ed.

HANGAR FLYING

Job Qualifications

A recent survey conducted by the Personal Aircraft Council of Aircraft Industries Association shows that the ability for a person to fly a plane is becoming increasingly important as a qualification for a job. More than 95 per cent of the executives who replied to PAC's questionnaire stated that the ability to fly would be a definite advantage in a career.

Super DC-3

The modernized version of one of the world's best-known air transports, the Douglas Super DC-3, will be the first commercial airplane to be completely equipped with fire-resistant hydraulic fluid. The Super DC-3's hydraulic system, improved to actuate gear-retracting and other mechanisms faster than on the original DC-3, will be operated with Skydrol, a non-inflammable fluid developed jointly by Douglas and Monsanto Chemical Co.

Round-the-World Flight

Plans have been announced for a round-the-world flight in a lightplane. The pilot . . . Jack Brazil; the plane . . . a new Johnson *Bullet*. Mr. Brazil will attempt to shatter the long-distance, non-stop lightplane record when he takes off on the first leg of his projected world-girdling flight, from Oklahoma City, Oklahoma, to Rome, Italy, a distance of 5500 miles over the Great Circle Route. Mr. Brazil expects to have a gross plane weight, at take-off, of about 3800 pounds. In addition to extra gas and radio equipment, he will carry such emergency equipment as life raft, flares, etc. From Rome, he will fly to Ankara, Turkey; Tehran, Iran; Karachi and Calcutta, India; Hong Kong and Shanghai, China; then to Tokyo, Japan, winding up with the 6300-mile non-stop hop from Tokyo back to Oklahoma City. Jack Brazil estimates the entire trip will require about 150 flying hours.

The Johnson *Bullet* which he will fly is a single-engine (Continental 185) low-wing monoplane which will seat four. In place of the seats for passengers, Mr. Brazil will carry a 300-gallon gas tank and extra radio equipment.

Duster Pilot School

Plans have been announced by Barrie Aeronautical Corporation at Lee Airport, Lockport, N. Y., for the inauguration of a duster pilot's course. This is believed to be the first state-approved course of its type in the U. S. Applicants to the school will be required to pass a rigorous entrance examination before they are accepted. The course will be over a six-weeks period and will include 100 hours of ground instruction as well as 30 or 40 hours of specialized flight training. This course is open to commercial pilots only.

Lightplane Operating Costs

"What will it cost me to operate an airplane?" That's a question frequently asked by prospective aircraft owners, and for an answer SKYWAYS has called upon Leslie A. Bryan, Director of the Institute of Aviation at the University of Illinois. Writes Mr. Bryan:

"The only honest reply is that there are so many variables in each situation that we cannot say. For example, there are wide variations in the number of hours flown, insurance costs, depreciation changes, and hangar rentals. Consequently, we really do not know accurately how much an operating hour will cost Jo Doe, farmer, of Savoy, Illinois, or Richa Roe, businessman, of Chicago.

"We do, however, know what it co the University of Illinois to operate fleet of light aircraft, and we are glad share this information with those who w to benefit from our experience. A summa table (from our bulletin, *'Light Aircr Operating Costs'*) will give the prospecti lightplane owner an idea as to costs, a from the table perhaps he can work c his own estimates. *(See chart below.)*

"It should be borne in mind when int preting the table that several of t airplanes listed in the chart were not op ated enough during the period to give fair statistical picture. This was probab true of the *Seabee* and the Beechcr 752B which were relatively new duri the period surveyed. The utilization on t others ranged from 105 hours on t Taylorcraft to 921 hours on the Aeron 1540E.

"The private-plane owner should be in mind several other things also. Fir insurance costs could be several tim greater than those shown in the table. Hu insurance might cost up to a dollar hour for complete coverage. Ground insu ance coverage alone would run conside ably less than complete coverage, b not as low as the table figures since tho figures are self-insurance costs. Second the direct maintenance cost plus sh overhead figure is probably higher tha most owner's normal cost. Probably, to the lineman's salary charge and the depr ciation in shop equipment would not h as high for an individual. On the oth hand, a private owner would have include hangar or tie-down charges.

"The most important point on cost however, is this: the more an airplane used, the less the per-hour or mile cost A personal aircraft has vast utility at sma cost for the owner who has imagination

University of Illinois Light Aircraft Fleet. Tabulation of All Costs. Feb. 1, 1948 to Jan. 1, 1949

Type	NC No.	Total Hours Flown	Total Fuel, Oil and Maintenance Per Hour	Shop Overhead Maintenance	Depreciation on Shop Equipment	Insurance		Linemen's Salaries	Depreciation on Aircraft	Total Operating Costs Per Hour
						Damage	*Public Liability*			
Cessna 140	2301V	542.2	$2.177	$1.14	$ .16	$ .08	$ .09	$ .54	$1.00	$ 5.187
Cessna 140	2324V	608.0	2.267	1.14	.16	.08	.09	.54	1.00	5.277
Piper Supercruiser PA-12	4185M	447.1	2.181	1.14	.16	.08	.09	.54	2.00	6.191
Beech A35	752B	38.4	3.553	1.14	.16	.08	.09	.54	4.00	9.563
Beech A35	720B	117.6	2.354	1.14	.16	.08	.09	.54	4.00	8.364
Beech 35	80460	343.2	5.772	1.14	.16	.08	.09	.54	4.00	11.782
Stinson 150	97692	455.8	4.966	1.14	.16	.08	.09	.54	3.00	9.976
Aeronca 7AC	82993	638.1	2.897	1.14	.16	.08	.09	.54	1.00	5.907
Aeronca 7AC	82994	712.3	1.525	1.14	.16	.08	.09	.54	1.00	4.535
Aeronca 7AC	82995	685.7	1.703	1.14	.16	.08	.09	.54	1.00	4.713
Aeronca 7AC	82996	600.8	3.647	1.14	.16	.08	.09	.54	1.00	6.657
Aeronca 7AC	82997	734.3	1.907	1.14	.16	.08	.09	.54	1.00	4.917
Aeronca 7AC	83427	690.6	1.506	1.14	.16	.08	.09	.54	1.00	4.516
Aeronca 7AC	83428	678.0	1.993	1.14	.16	.08	.09	.54	1.00	5.003
Aeronca 7AC	83429	634.0	2.067	1.14	.16	.08	.09	.54	1.00	5.077
Aeronca 7AC	83430	728.0	1.939	1.14	.16	.08	.09	.54	1.00	4.949
Aeronca 7AC	83431	587.6	3.204	1.14	.16	.08	.09	.54	1.00	6.214
Aeronca 7AC	1536E	725.6	2.272	1.14	.16	.08	.09	.54	1.00	5.282
Aeronca 7AC	1537E	531.5	4.199	1.14	.16	.08	.09	.54	1.00	7.209
Aeronca 7AC	1538E	745.1	2.110	1.14	.16	.08	.09	.54	1.00	5.120
Aeronca 7AC	1539E	875.0	2.580	1.14	.16	.08	.09	.54	1.00	5.590
Aeronca 7AC	1540E	921.8	1.554	1.14	.16	.08	.09	.54	1.00	4.564
Aeronca 7AC	1541E	700.8	3.025	1.14	.16	.08	.09	.54	1.00	6.035
Cessna 120	89546	640.0	1.965	1.14	.16	.08	.09	.54	1.00	4.975
Cessna 120	89623	590.5	1.687	1.14	.16	.08	.09	.54	1.00	4.697
Ercoupe 415-C	86979	238.3	4.125	1.14	.16	.08	.09	.54	2.00	8 135
Ercoupe 415-C	99272	255.3	4.940	1.14	.16	.08	.09	.54	2.00	8.950
Seabee RC-3	6717K	24.0	5.720	1.14	.16	.08	.09	.54	3.00	10.730
Boeing A75N1	51443	442.1	3.484	1.14	.16	.08	.09	.54	4.00	9.494
Boeing A75N1	57843	431.6	3.083	1.14	.16	.08	.09	.54	4.00	9.093
Boeing A75N1	64078	129.1	6.000	1.14	.16	.08	.09	.54	4.00	12.010
Taylorcraft BC-65	27460	105.7	2.269	1.14	.16	.08	.09	.54	1.00	5.279

INSTITUTE OF AVIATION of University of Illinois operates a fleet of 32 airplanes. Chart shows tabulation of fleet operation costs

PROP WASH

Aero Oddities

Double Dose. Enroute to Texas on an assignment and flying his own Stinson *Voyager,* a pilot landed at Mineola, Long Island, N. Y., for gas. As he stepped from plane, another pilot in a Waco taxied into the Stinson, chewing up its right wing. Arrangements were made for a new Stinson while other one was being fixed up, so pilot could continue on to Texas. Landing at Mineola, Texas, pilot stepped out of ship only to have another Waco with another pilot at controls taxi into Stinson and chew up its right wing. *(D. M. Van Tassel Jr., Westover AFB, Massachusetts)*

Solo Prowess. On student's first solo flight, engine of trainer cut out as ship turned on downwind leg. Student dropped nose of plane to pick up some flying speed, managed to get over ridge of trees, over river, then landed dead stick in farmer's field. When instructor chased over to congratulate student on nice job, student greeted instructor with, "Gee, I'm sorry about breaking the prop . . . I shouldn't have nosed over!" *(Peter Wessel, Hollywood, California)*

Rain Dispersal. A Brooklyn, N. Y., resident startled airline managements by suggesting that "a 24-hour cessation of airplane flying would solve the rain problem. How can we have rain while those powerful machines are scattering the clouds in every direction?" the Brooklyn-er asked. *(R. S. Linnell, Segreganset, Mass.)*

Diagnosis. It happened during the war and at North American Aviation's plant at Los Angeles. A B-25 with a stuck landing gear was circling the field. The pilot called the tower for engineering advice. An engineer was put on the mike and advised the pilot where to fill the leaking hydraulic system with fluid. "But we're all out of fluid," radioed the harassed pilot. "Then try coffee or water," replied the engineer. "There isn't any," answered the pilot. Shortly thereafter, the landing gear came down and the test pilot landed safely. He taxied up to the flight line and filled out his squawk sheet. The last line read, "I suggest this airplane be given a complete urinalysis." *(D. Chase, Pasedena, California)*

New Orders. Pilots of Chinese Nationalist Air Force received several new *Mustang* fighters and immediately proceeded to carry out some "on the deck" strafing of Communist Army troops. Within few minutes, several of new fighters were shot down. Thereupon came new orders from Headquarters restricting strafing to safe altitude of 6,000 feet! *(W. M. Bodie, Alpine, California)*

Says Who? Seated at counter in airport restaurant, pilot and instructor were discussing use of skis on aircraft. Pilot's wife joined conversation with comment, "Skis on a plane? That's silly . . . where's there a hill around here big enough for planes to ski on!" *(Laurence Geitzel, Brandon, Wisconsin)*

Att'n Readers:

If you have any news note oddities pertaining to aviation, send them to SKYWAYS, Box 17, 444 Madison Avenue, New York 22, N. Y. Five dollars will be paid the sender of each "oddity" printed. Contributions cannot be returned unless accompanied by stamped addressed envelope. The decision of the editors is final.

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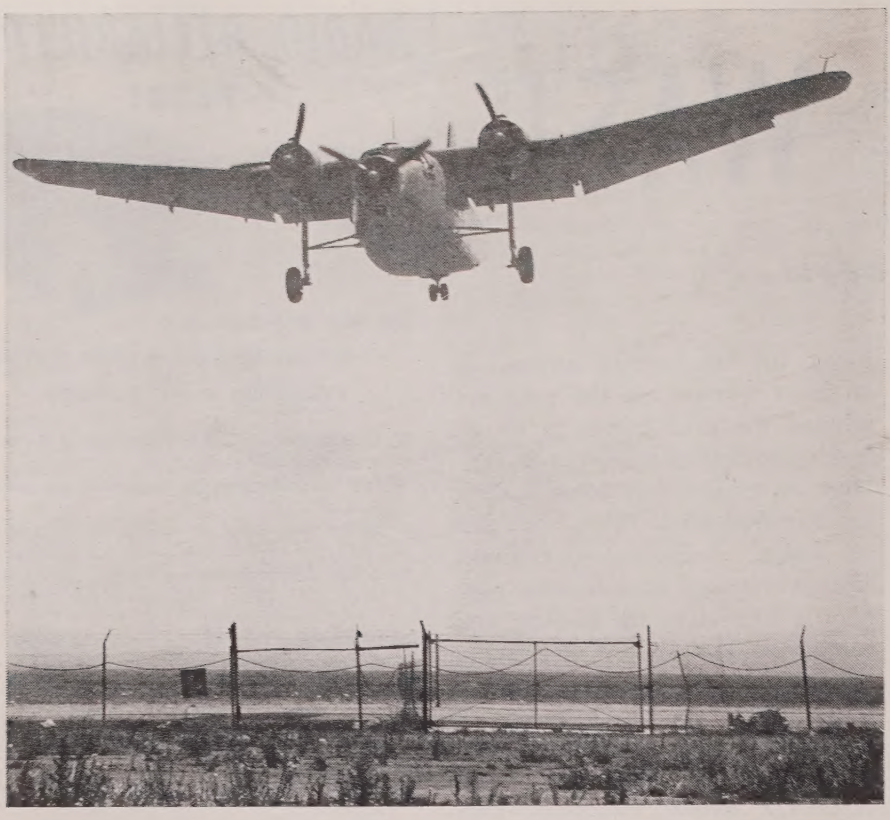

NORTHROP C-125, Air Force's newest cargo plane, is shown here in its first flight. Called *Raider,* the hefty three-engine ship will be used in lieu of gliders in combat areas

MILITARY AVIATION

Additional Service Academy

Secretary of Defense Louis Johnson has submitted to Congress the draft of a bill to provide for an additional Service Academy to supplement the U. S. Military Academy at West Point and the Naval Academy at Annapolis. The proposed legislation would authorize Johnson to acquire lands to construct and maintain such buildings and facilities he might deem necessary to operate the Academy on a temporary basis, pending construction of a permanent academy. An estimate of the cost involved approaches $171,000,000.

ATS Openings

The 8522 Air Transport Squadron, Corollary Unit of the MATS now has openings for 100 enlisted airmen. Vacancies exist in such highly specialized skills as radar, radio and aircraft operation and maintenance as well as in several administrative categories. Enlisted Air Force Reservists including qualified veterans and non-veterans may participate in the active Air Force Reserve Program. Those accepted will be trained at the MATS Terminal, Washington Nat'l Airport.

Boeing Brake

Boeing Airplane Company has developed a new automatic aircraft safety braking system which reduces stopping distance an average of 33⅓ per cent, and in some cases as much as 50 per cent. In addition, this new braking system prevents skidding, all of which means an increase in tire life. This development allows large aircraft to make emergency landings on small airfields and on any type of runway. The Boeing braking system is being manufactured and sold by Hydro-Aire, Inc., of Burbank, California. The system has been tested with a great deal of success on the Boeing XB-47 jet bomber.

C-123 Ready

Chase Aircraft Company is putting the finishing touches on its new giant C-123, troop and cargo-carrying transport. The C-123, a twin-engine transport, is twice the size of earlier Chase Aircraft models. It is powered by two Pratt and Whitney R-2800 engines. As a personnel carrier, the C-123 can accommodate 60 fully equipped troops or 50 litter patients and medical service personnel. Top speed of the new transport is estimated at over 250 mph, cruising at 200 mph, and range at 550 miles.

Hurricane Hunters

The Air Force "Hurricane Hunters" stationed in Bermuda have formed a society to permanently recognize the military personnel who have participated in reconnaissance flights through severe tropical storms. Called the "Loyal Legion of Hu[rri]cane Hunters," membership numbe[rs] some 300 military personnel who ha[ve] flown one or more missions in the Atlanti[c] Caribbean or the Gulf. The Hurrican[e] Hunters, Air Weather Service's 373rd R[e]connaissance Squadron, operated fro[m] Morrison Field, Florida, before their acti[vi]ities were transferred to Bermuda in 194[5].

Short Bits . . .

The initial production model of North[rop]'s C-125 *Raider,* a three-engined tran[s]port for the USAF, has begun an accele[r]ated test program. A total of 23 *Raider*[s] are on order, of which 13 are to be use[d] as assault transports, and 10 as rescu[e] planes in the Arctic regions.

●

Two Navy jet fighter squadrons based [at] Cecil Field in Jacksonville, Florida, a[re] being equipped with McDonnell *Banshee*[s]. These will replace the *Phantoms* th[e] squadron has been flying for sever[al] months.

●

Boeing's six-jet B-47 will be the standar[d] medium bomber for the USAF. Althoug[h] already in production, later versions a[re] scheduled to get more powerful jet engine[s] and to have an increased fuel capacity[,] all of which will increase the now com[-]paratively short range of the ship.

●

The Marine Corps recently opened [a] jet engine school at Marine Corps Ai[r] Station, Cherry Point, North Carolina. [The] School will be used to train mechanic[s] in most up-to-date methods of overhau[l] and repair in jet engine field.

●

Word received from McDonnell Aircraf[t] indicates the XF-88 *Voodoo* is the ship th[e] USAF plans to use to try to beat th[e] existing speed record of 670 mph held b[y] the North American F-86A powered by [a] GE J-47 turbojet. The *Voodoo* carries two Westinghouse J-34 jet engines.

●

Winner in the Allison Jet Race at Cleve[-]land during the recent National Air Races was Lieutenant Walter C. Rew. Flying an F-80C, Lt. Rew's speed was 594.8 mph.

●

In the Thompson Jet Race, the winner was Capt. B. Cunningham. Flying an F-86A, his speed was 586.1 mph. This race was a closed-course race, 15 miles over 10 laps, while the Allison Jet Race was a straightaway from Indianapolis to Cleveland, a distance of 260 miles.

●

In the Navy's Jet Carrier Race, from the carrier *Midway* in the Atlantic to Cleve[-]land (432 miles), the winner was Lt. R. S. Laird. Flying a *Banshee,* his speed was 548.9 mph.

●

In the Bendix Jet Race, the winner was Major Vernon Ford. Flying an F-84E from Rosamond Dry Lake in California, to Cleveland, Ford's speed was 529.6 mph.

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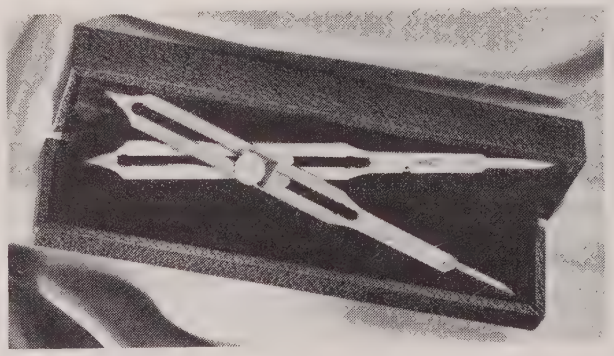
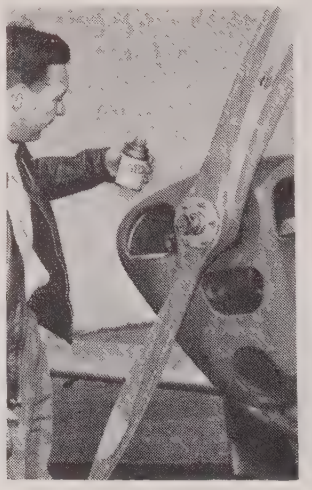


WEEMS new finely m Proportional Dividers able quick, accu solution of speed-ti distance problems in b sea and air navigat Given any two of th quantities — speed, ti distance, the third can found quickly with convenient linear sc It sells for $24.00, an comes packed in very trim instrument b

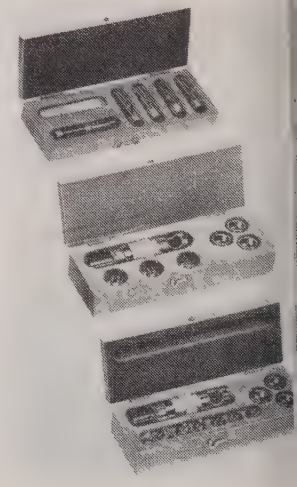
PILOTS with a yen for long X-C's and a need for lightweight luggage will be interested in this canvas and leather luggage by Boyle Leather Goods, Inc. Choice includes 4-pr. shoe bag, 4-suiter, hat bag, overnight bag and an oversized bag for the whole family's gear. Prices run from $12.50 up. The five-bag unit weighs only 18 lbs.

WEATHER glasses, veloped by Willson Pr ucts, Inc., are someth new for airmen. Uti ing special yellow lens these new glasses m things look brighter dull days and help pil to see through haze a mist. They are not to used in the sun and not a sun glass. Price given as $12.50, hig for own prescripti



PLASTIC coating called Krylon has been found suitable for protecting props against surface scratches and undue wear. Krylon also can be applied to the surface of an airplane itself. Krylon resists rust and corrosion.

ACCESSORY TOOLS for aircraft use have been announced by Aircraft Tools, Inc. Three new sets are for use with Huck Lockbolts. Named AT-590D Inspection Kit, tools were designed to aid aircraft shop man.



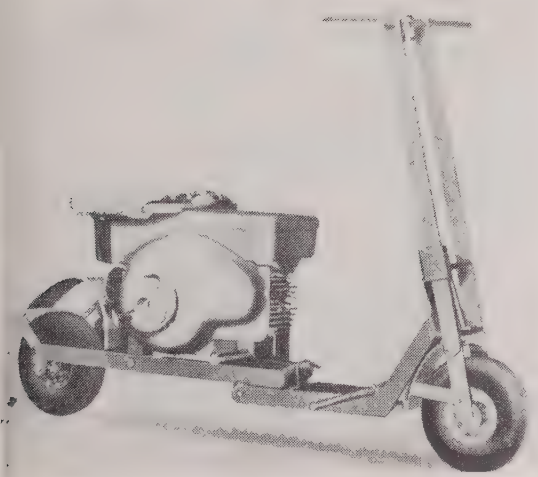
Aero Equipment

NEW automatic full-swivel steerable tail wheel assembly unit is announced by Scott Aviation. This one (above) has been especially designed for the Stinson and other four-place aircraft. The unit (8-inch wheel) is called the "Scott Model 3200."

BINOCULARS for the sportsman flyer have been announced by the Weimet Camera Corporation. These 7 x 50 binoculars have excellent light transmission and unusual brilliance. With hard-coated lenses and prisms, glasses sell for $58.00 plus Fed. tax.

TELEX earset is a new development in headsets for the radio-equipped plane. Called "Earset," it is a single-phone headset weighing only half an ounce, and was designed for efficient, comfortable operation. Earset will fit any shape or size ear, right or left, and fits snugly so it cannot slide off. It is equipped with standard connection. product of Telex, Incorporated.

GUNK is a popular degreaser with aircraft mechanics, and it is now available in quart sizes. It is a versatile, diphase solvent that cleans stubborn oil stains. Gunk safely cleans engine compartments and launders oil-soaked fabric; is especially useful to plane owners.



TRANSPORTATION from airport to town is now solved, thanks to the new Scooter Cub, a small collapsible motor scooter which folds into a unit that can be carried in most small aircraft. It has a speed of 20-mph and burns a gallon of gas per 100 miles.

Memo from

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Arctic Research - USN

NAVY'S transport, the Douglas R4D modified for aerial mapping, gets an extra boost for take-off from JATO. Equipped with skis, the transport's take-off run is longer. JATO, however, gets the ship up in a hurry

Two basic problems confront Naval aeronautical engineers in cold-weather operations. These are: 1) adapting the aircraft to its environment and, 2) making the aircraft inhabitable and usable under these conditions. The first problem is one of the aircraft against the elements and the second is the pilot against the elements.

Development results from scientific experimentation. It is the logical end of the progression from the idea to the practical application. In Naval research and development, we follow

PHOTO-MAPPING project recently undertaken was first in Alaskan area in 20 years. Planes used, Lockheed P2V2 *Neptunes (below),* were equipped with special improved cameras. The film was processed on way back to planes' base

ADM. LONNQUEST is Ass't Chief, Research and Development, BuAer

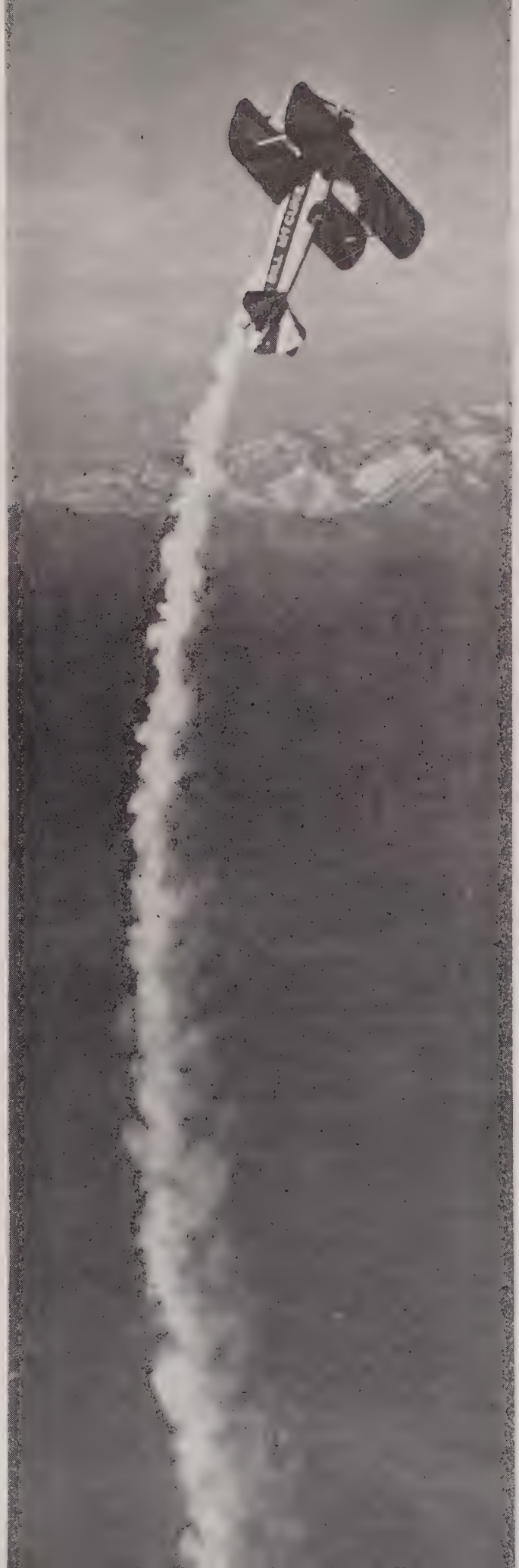
OPERATION of all types of aircraft under extreme cold is continually under study by Department of the Navy

By Adm. T. C. Lonnquest, USN

the same course and our results are the product of such synthetic experimentation. We try first to get the aircraft to do the job and then train the pilot to carry out the designated work of the aircraft. By the time we bring a plane to the Arctic or Antarctic, we are not so concerned with its operational qualities under normal conditions, but rather we are interested in adapting that particular type to flying conditions in these areas. Most of our work has been tested in laboratories under simulated conditions and the results evaluated. The *(Continued on page 47)*

CLOTHING that will protect airmen in arctic regions has been developed by Navy and tested under simulated conditions

NAVY CARRIERS operate in arctic regions as part of research program for study of "warfare" in polar areas



FLIGHT PATH of an airplane should not be changed too quickly. The wing rebels and then simply quits flying

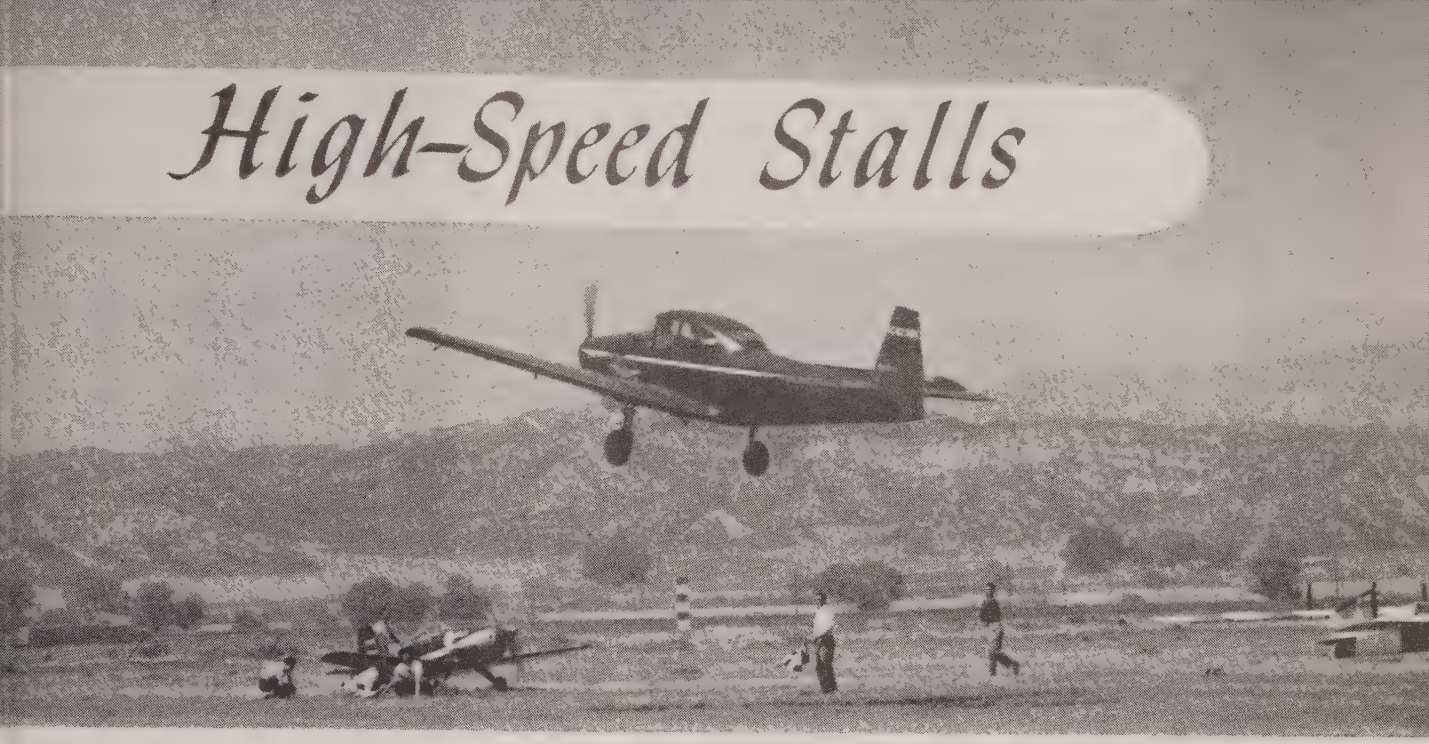
An airplane can be stalled at any speed . . . don't let yours get away

By DANA CRAWFORD

Here is an article that every pilot should read. If you already know the material that is in it, you're a well-trained pilot. If you don't, the following information may keep you out of trouble.—Ed.

AEROBATICS *(left)* are safe when performed with care. Many a stunt pilot, however, puts his ship into high-speed stall by trying to hurry maneuver. The duster *(below)* is purposely in high-speed stall to powder corner of field

High-Speed Stalls



FLIGHT PLANNING was the lack here. This airplane came in downwind, against red flag during running of midget races in California. Pilot poured on power to go around again. It was just plain luck that his plane didn't stall

ANY airplane can be stalled—at any speed! An F-51 came in for a landing out of a steep glide and hit so hard that the landing gear flew off—at 40 mph above stalling speed!

A Douglas test pilot during the war repeatedly stalled his SBD dive bomber while going straight down, at speeds approaching 300 mph, just to find out if any of its parts were loose.

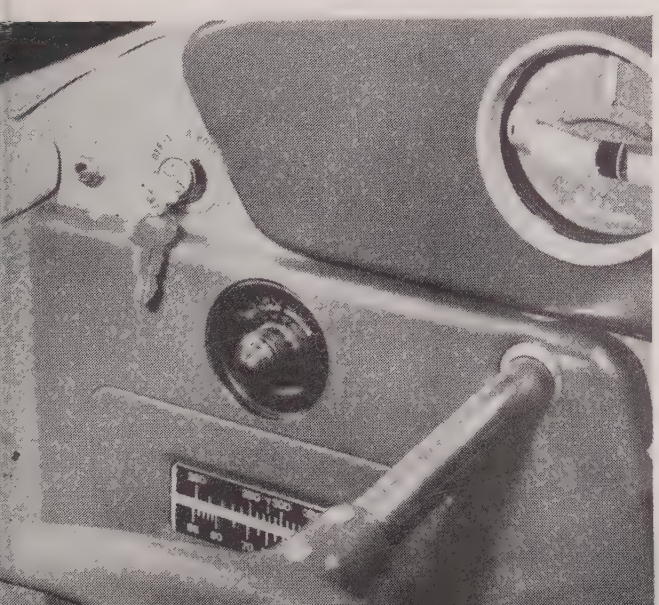
The jet F-80 lands at 100 mph, but test pilots demonstrate stalls at 400 mph when they come back fast enough on the control wheel.

But high-speed stalls are not restricted to high-speed aircraft. Any pilot can build up an "accelerated stall" in a modern family airplane by being too heavy-handed in applying back-stick pressures.

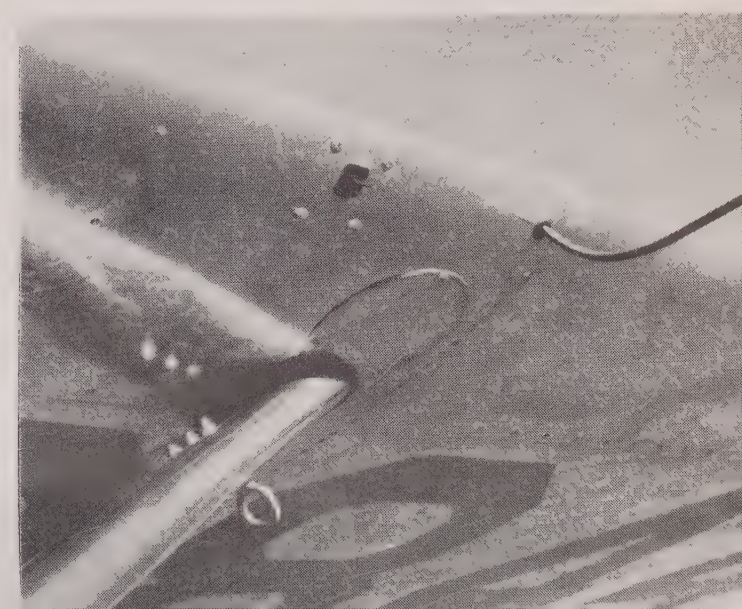
Ask the average pilot at what speed an airplane stalls and he'll quote the straight-ahead landing speed of that particular airplane. But what about gusty air, power setting, baggage overloads and most important, the "g" loading or acceleration of the airplane?

High-speed stalls are no mystery to pilots who came all the way up through military schools and had old-time primary instructors demonstrate this phenomenon *(Continued on page 58)*

SAFE FLIGHT INDICATOR is included as standard equipment on many of today's personal planes. Photo here shows installation of the safe flight stall warning indicator on the left side of panel of a new four-place Cessna 170



VANE-TYPE stall warning device is shown here mounted on the wing of the new Cessna 170. Vane is mounted a little below normal stagnation point so that deflector remains down-and-off under all safe flight conditions



Flight In A Basket

NAVY MEN surrounding limp mushroom-like bag are superintending a delicate process — that of inflating the balloon

By WALTER W. BOYD, CMDR, USN

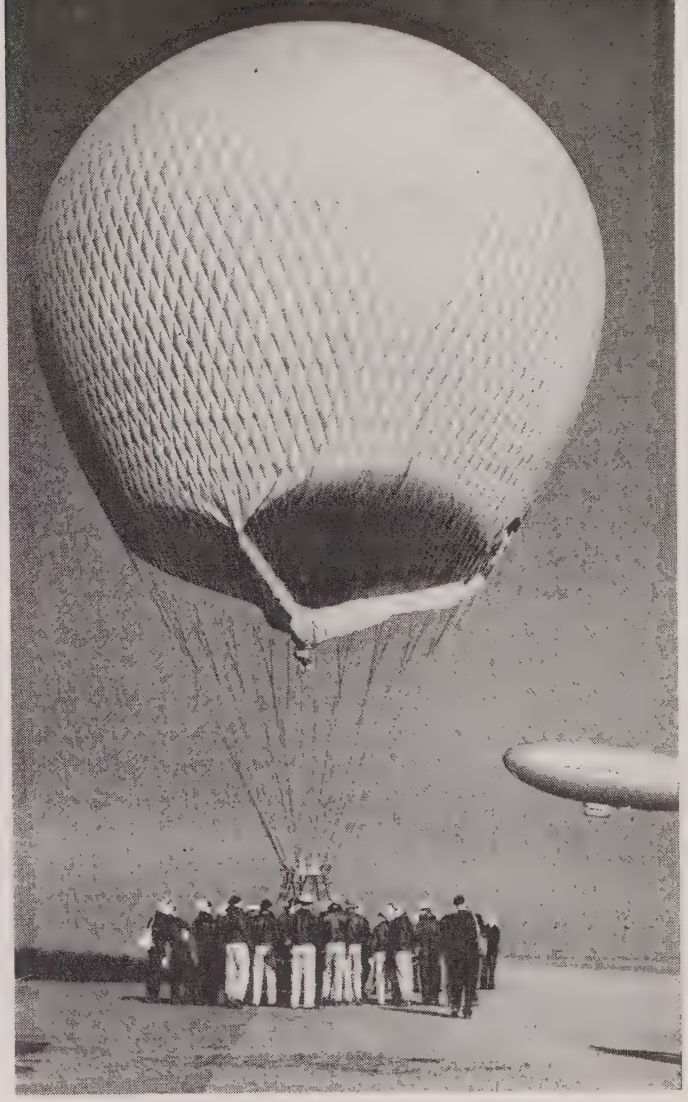
FREE-ballooning is the technique of flying a motorless lighter-than-air craft using only the wind for power. It was the first form of flying known to Man. Men free-ballooned across the English Channel in three hours flying time as long ago as 1785—a hundred and eighteen years before the Wright Brothers first successful aeroplane flight.

Today free-ballooning is outmoded and almost forgotten in an airminded age full of helicopters, gliders, airships, jet-propelled aeroplanes and "flying saucers." Few people know that it has always been, and still is, one of the most unique and fun-packed ways to fly. Free-ballooning is to the airshipman what sailing is to the midshipman—Sport, and a chance to brush up on fundamentals. It is a little too expensive for the average guy to take up as a hobby at present, but public interest could quickly rectify that situation. In the meantime it will cost you nothing for an exciting trip if you care to re-live with me the experience of my first overnight free-balloon flight. After all, I would hate to see you miss, through any lack of consideration on my part, the chance to learn something about this really different sport. But I warn you, if you

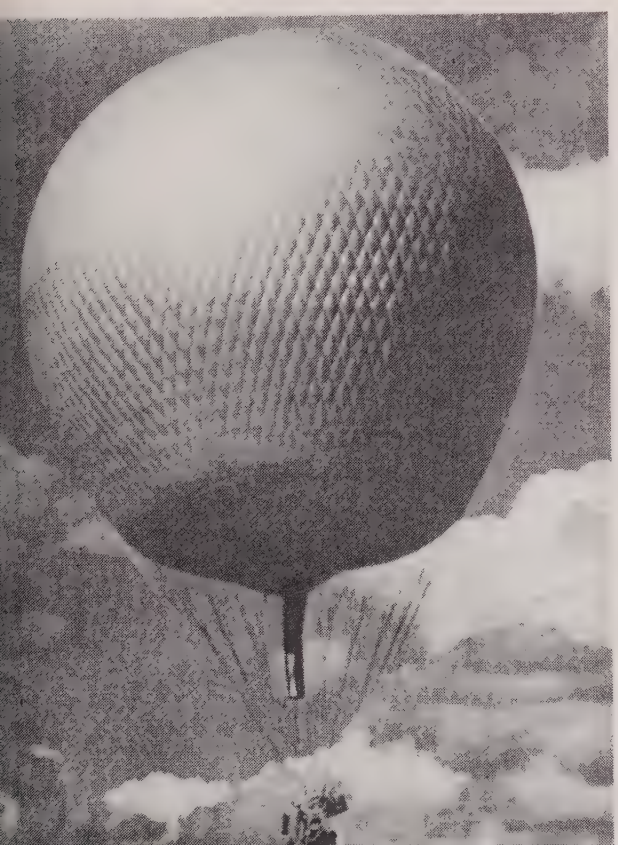
BAG, half inflated, begins to take shape. Each man is regulating sand bag cords to make sure bag fills evenly

become interested in ballooning and just can't understand how you've struggled along through life so far without a balloon of your own and can't bear the thought of going on without one, don't come around and expect me to underwrite your buying one. I positively will not guarantee balloon flights. They are too unpredictable. Why, when you take off you don't even know where you are going to land (which, by the way, is one of free-ballooning's sporting features). All I can guarantee is that you will find free-ballooning different and definitely not boring. It will be different because any time you go sailing over hill, down dale and through the woods in a magic "clothes basket," it is different. And you can't feel bored while hanging on to a tree branch with one hand and trying with the other to get priceless home movie shots of deer drinking from a stream almost within touching distance below you, or while frantically bailing sand out of your basket to get up out of reach of that farmer into whose tomato patch you have innocently dropped, were tempted, and are not so innocently departing!

As a lighter-than-air naval aviator student at Lakehurst, I was required, among other things, to be a balloonist. For your information, a balloonist is a guy who is just crazy enough to calmly let them stick him into that clothes basket suspended from a gas-filled bag, thrust pigeons and sandwiches *(Continued on page 52)*



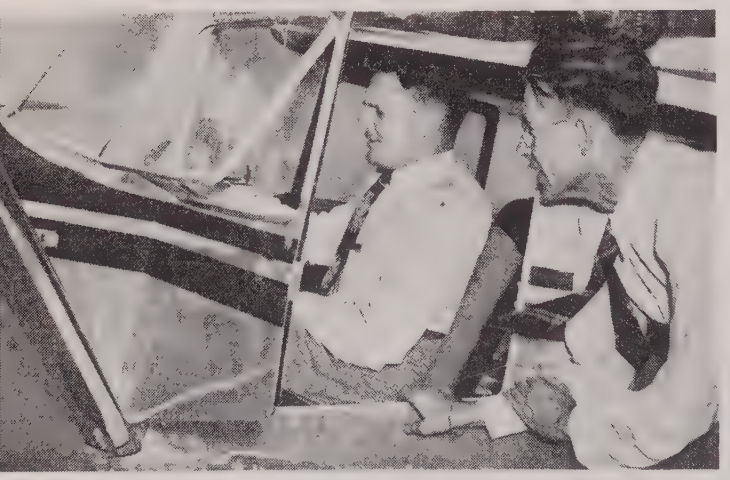
FREE BALLOON all inflated, it strains at its ropes prior to the get-away. Navy men *(below)* climb into the small basket, soon to be whisked away on a breeze to adventure



ALOFT . . . and where men will end up in free-balloon trip is a question. One thing's certain, they'll have fun

Pilot's Report... The Cessna "140"

CESSNA 140, now a completely all-metal airplane, is a plush little airliner that any 35-hour pilot can fly



DEALER Jim Most *(below)* shows Pilot Downie the new gadgets and gauges that are standard on the new Cessna 140

INSTRUMENT PANEL on the Cessna 140 is one of neatest devised for personal planes. Note room for possible extras

By DON DOWNIE

HERE'S a plush little two-place airliner that any 35-hour pilot can fly. The mighty midget of the Cessna line, the 140, is now completely metal. This latest change is a logical conclusion to their stable of four- and five-placers that have been all-metal for nearly a year.

If you like an airplane that has that solid feeling in the seat of its controls as it slows down for a landing, try this 140 Cessna. We flew the complete traffic pattern at less than 45 mph Indicated, and found the little airplane to respond perfectly to the controls at stalling speeds.

The first 90-hp, all-metal 140 to reach the West Coast was delivered to Jim Most, the East Los Angeles dealer. N9412A had only 15 hours

FLIGHT PHOTO of the new "140" shows its chunky wing design. The "170" and "140" use same outboard wing panels

on its recording tachometer when we flew it for this SKYWAYS article.

"This ship is so easy to fly," said Jim Most, "that you don't need to worry about either greenhorn or out-of-practice pilots."

So we asked Dr. Ralph Netzley *("Fly Baby" October 1949* SKYWAYS) to come along and do most of the work on this flight. The Doctor has logged almost no pilot time since Pearl Harbor and was quite "rusty."

"This ship has to be a cinch if I can fly it after all these years away from the controls," grinned the Doctor.

It was and he did.

To begin with, this new 140 is a beautiful looking airplane. It's clean, compact and rugged. More important, the beauty on this ship isn't just skin deep. The ship is built to 150 degrees of the required strength and any maneuvers requiring full application of the controls are permitted as long as the maneuvering speed of 106 mph is not exceeded and the baggage compartment is empty.

The little Cessna looks a great deal like its four-place big brother, the 170, and with good reason. Both airplanes have the same outboard wing panels, landing gear and tail cone. The

EXTRAS on the plane that Downie flew included wheel pants, a McCauley prop, landing lights, two-way radio

LAST LEG of three-hour test flight was from Tehachapi *(below)* back over the Mojave Desert and into Los Angeles

PHOTOGRAPHERS favor the "140" for hurry-up assignments because of its good cruising, slow-flight characteristics

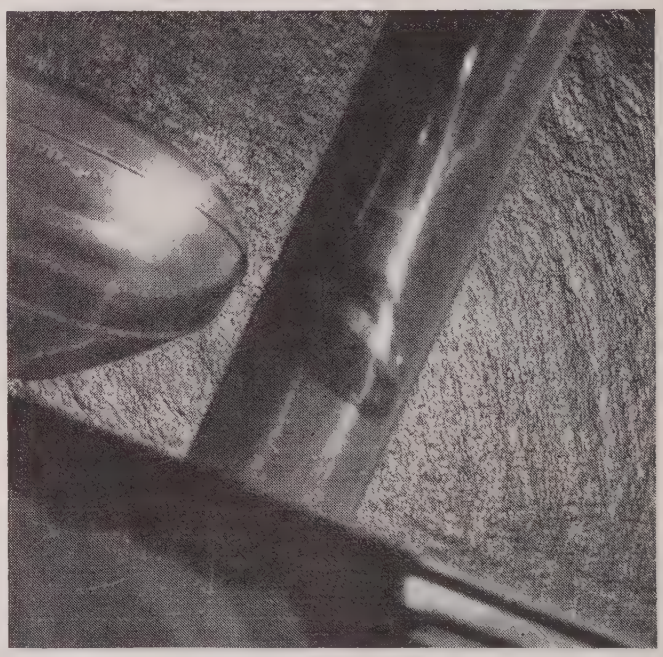
two-place center section has the same airfoil section but is 2 feet, 8 inches shorter than the 170.

This doubling-up on fabricated parts is in line with the factory's plan for cutting down manufacturing costs and, in addition, makes the three different airplanes strikingly similar to fly. Any pilot who has checked out in the 140 can climb right into the four-place 170 and feel completely at ease. He'll never realize that he has two additional passengers until he turns around in the cockpit to reach for something off the hat rack.

Actually, you can carry four people in the 140—as long as the two in the jump seat at the bottom of the baggage compartment don't weigh more than 80 pounds. This children's rumble seat adds greatly to the utility of the new 140 for parents with small fry.

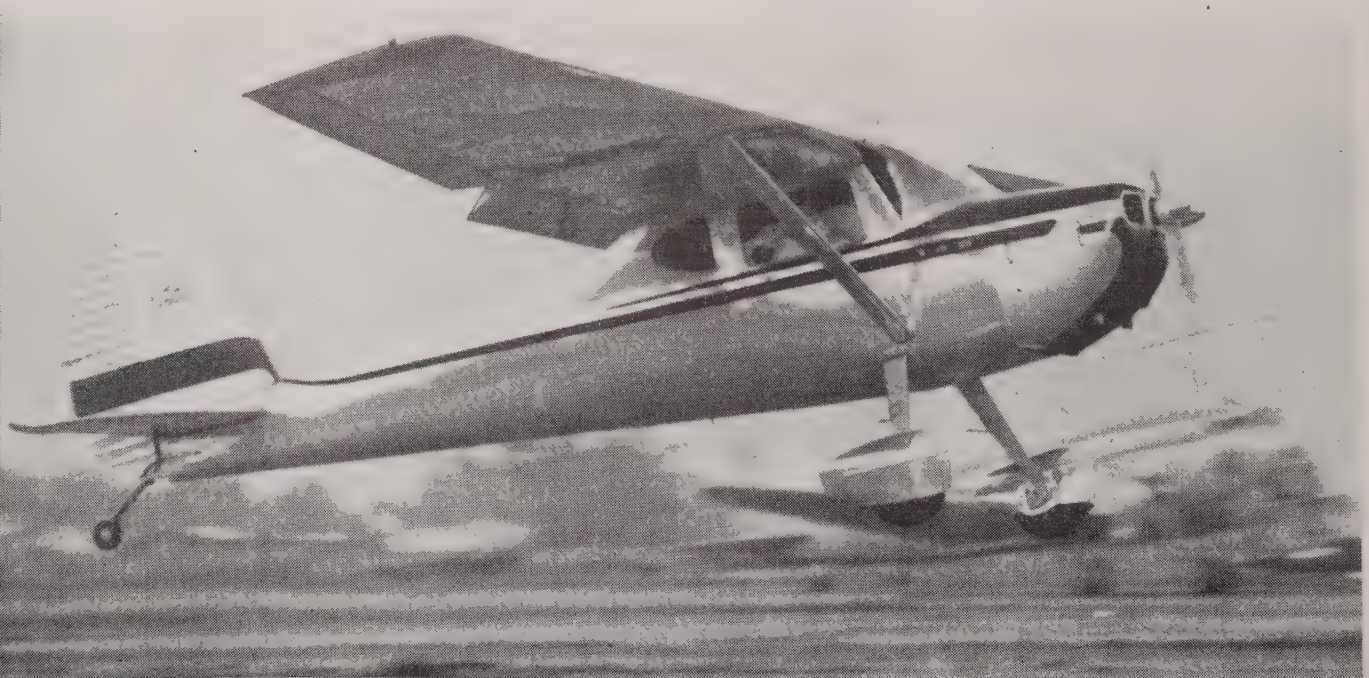
We walked around the shiny airplane at the East Los Angeles airport and checked the gas and oil before take-off. The new engine cowling is completely removable without pulling the propeller; a wrinkle that will cut maintenance costs. Heavy rubber "dynafocal" engine mounts drop vibration to a minimum.

A new plan is offered by Cessna to install a customer's 85- or 90-hp engine in a new 140. If you have a spare engine *(Continued on page 51)*



AIR SHOT, looking down to Pacific Ocean, shows new Cessna 140's rugged single strut and sleek, sturdy wheel pants

FLAPS on the Cessna 140 are larger and more effective than flaps on older models. The flaps go down 43°



ON THE LEVEL

By BEN ROBIN

In society it's not polite to look down our noses. In modern planes the same practice doesn't tell when we're in level flight. Plane manufacturers are hanging the engines lower and lower onto the front end of the fuselage. This increases forward visibility in flight. It also makes it increasingly difficult to tell when we're flying level. There is only one answer. Don't depend on the nose of your plane to decide when you're diving or climbing. Use the wing tips. The angle they make with the horizon will signal at once—level—climb—or dive.

If you want a double check, the airspeed indicator, altimeter and rate-of-climb will give it to you. When flying a low-wing plane, these instruments are your only level-flight check.

The new Cessna 170 is a good example of a high-winged plane having excellent visibility in the level-flight position. Actually the nose sits so low in the air that it is of little use in judging attitude. Just glance at the wing position with reference to the horizon—and you'll spot the level-flight position easily.

This little trick can save you plenty of time on future cross-country flights. It is often possible to gain as much as 10 mph cruising speed by getting up on the step. Too many cross-country pilots fly along in a mushing attitude pushing a lot of unnecessary air with their wings.

If you are flying a low-winged craft like the *Navion,* ignore the wing position. Use your instruments to discover the level-flight position. The airspeed indicator, altimeter and rate-of-climb can be used for this check. All these instruments have lag. In other words they follow the aircraft changes in attitude only after a slight pause.

This is the way to use your airspeed indicator when seeking the level-flight position: Place the aircraft in a slight dive. This attitude can be easily determined by watching for the air speed to increase. From the diving attitude gently bring the wheel back while watching the airspeed needle. You will note that because of lag, the speed indicator will continue to show an increase for a brief instant. As you continue to apply wheel back pressure and the nose comes up gently the airspeed indicator will finally hesitate before starting back the other way. At this instant of hesitation, when the needle stops momentarily, you are passing through the level-flight position. Apply wheel forward pressure and hold the needle still.

This will require a little practice. At first you may tend to overcontrol and the nose will oscillate through the level-flight position. But always remember this: *When the airspeed indicator is increasing or decreasing and you apply control pressure, the pause before needle reversal is level-flight position.*

The same procedure may be used with the altimeter or rate-of-climb instruments. The rate of lag is greater in these instruments, however.

PILOT flying a low-wing airplane will find his only level-flight check is his air speed, altimeter, and rate-of-climb

PIX TAKER Hal Rumel flies a BT-13 because it offers unobstructed visibility for camera work, has good range

FIRST PLANE used by Rumel was an *Ercoupe* he bought, secondhand, for $1800. Ship wouldn't carry all his photo gear

FLYING PHOTOG

ENROUTE to ground photo assignment, Rumel shot pix of Colorado River from air which brought him extra dollars

By BOB ARENTZ

HAL Stevens Rumel, 49 West 3rd South St., Salt Lake City, was no different than many other business men regarding aviation. He liked to fly and had a private license, but he questioned being able to afford a plane of his own. He knew what fixed expenses on a $4,000 airplane would do to the old cost-per-hour equation when you fly less than 75 hours a year and come to figure up depreciation, hangar, insurance, inspections and miscellaneous sums. He knew that many executives save time and money by air travel, but his business was localized. Rumel is a commercial, advertising, portrait and industrial photographer whose work is nationally known. With six employees and a business that has grossed $50,000 a year, he doesn't have much spare time.

Owning a plane for sport seemed impractical, except possibly as a flying club member. But airplanes kept getting into his act. An industrial job came up in Wyoming the day he had to photograph an important Salt Lake wedding at 7:30 p. m. He hated to pass either assignment up.

He rented a plane, left at dawn, shot his Rock Springs pix by 2 o'clock and returned promptly; taking one and one-half hours over and two hours back. The negatives were developed before supper and after a good hour's nap he was on hand for the wedding, rarin' to go. Plane rental cost less than $35 and he "saved" a $200 assignment.

Another trip by air to Jackson Hole, Wyoming, boiled a hard day's drive down to two hours in a BT-13 on assignment to make some barroom murals for a swanky gambling joint.

Then, one of Salt Lake's leading department stores hailed him in and handed him a raft of spring and summer fashions; sport togs, play suits, bathing apparel *(Continued on page 44)*

PILOT RUMEL flies the BT from front cockpit. When he shoots such pictures as this one *(above)* of Utah's Kennecutt Copper ore pit, he rolls stick between his knees to hold plane in position, thus freeing both hands for handling the cameras

PILOT-AUTHOR ODOM checks his *Bonanza's* maintenance record with Tex Sallee, flight engineer at Odom Aviation, Teterboro

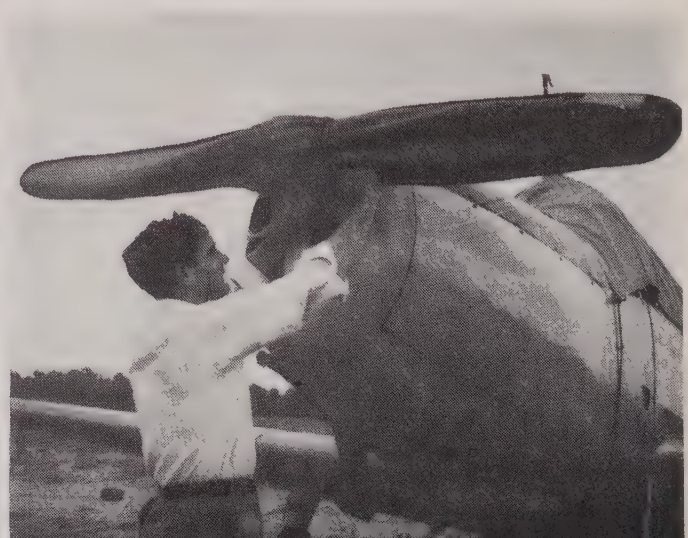
Plane Care for Flight

Keep your plane clean and you'll keep a better check on your ship's shape

By BILL ODOM
with Carroll "Tex" Sallee

GAS SUMP should be checked for water accumulation. If there's water in the gas, it will show up on your hand

ESSENTIAL ITEMS for a plane that's left outside are canvas prop and greenhouse covers, as are on this PT-26



Photos by Bill Price

PROBABLY the best all round rule for maintaining an airplane is: keep it clean.

There's psychological advantage in always being proud of a clean airplane, but more important, there are real practical advantages to aircraft cleanliness:

1. A clean surface cannot hide defects, corrosion, tears or fabric wear that may be obscured under a grimy surface.

2. The more you wipe down, wash, polish your airplane, the better you get to know it and the quicker you will be able to detect any changes from the normal.

3. Only a clean engine compartment will show you when any normal oil seepage develops into a serious oil leak.

4. A clean cabin, cockpit, engine nacelle, and baggage compartment will minimize the chances of loose nuts, bolts, screwdrivers, etc., fouling up control cables.

5. Grime, oil residue, water, etc., deteriorate fabric surfaces and aid corrosion on metal surfaces.

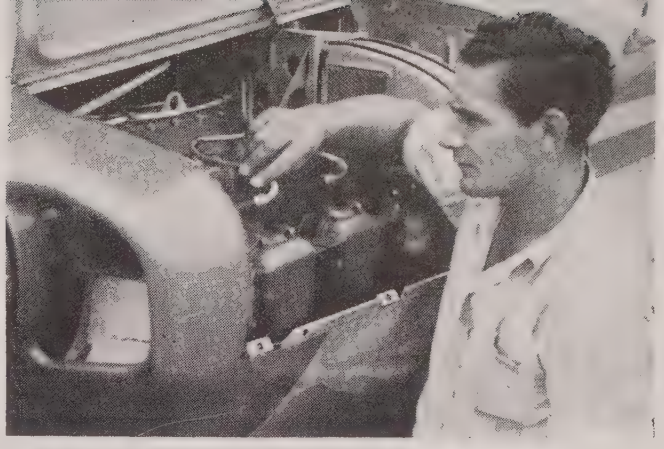
The responsibility for this cleanliness for adequate maintenance of an airplane for its safety in flight always has, and probably always will, reside in the pilot.

All the mechanics and all the checks in the world cannot exempt a pilot of a lightplane from that responsibility.

There are two ways in which a pilot can best insure that this responsibility to himself and to his passengers is carried out.

The first is a thorough pre-flight check, and the second is a factor which pilots more frequently neglect—a thorough "gripe sheet."

A little later, we'll go through an outline for a suggested pre-flight *(Continued on page 45)*



CHECK the spark plug terminals, making sure connections are tight so that vibration won't loosen them in flight. If you tie-down your ship, make sure rope is not too tight. Tex *(below)* demonstrates right degree of tautness

PRESSURE of tires is important. In this photo, Tex is checking tires of Cessna 170. It should be 24 lbs/sq. in.

TIRES that are too soft can cause accidents. On landing on a too-soft tire, rim can cut sidewall, break through

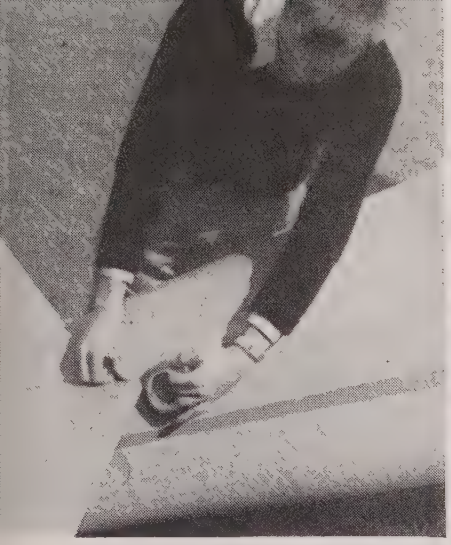
AIR PHOTO *(above)* shows competing planes lined up at Wings Field, located outside Philadelphia, before race take-off

COURSE given out, pilots go to work with their maps, dividers, computers

Philly Regatta

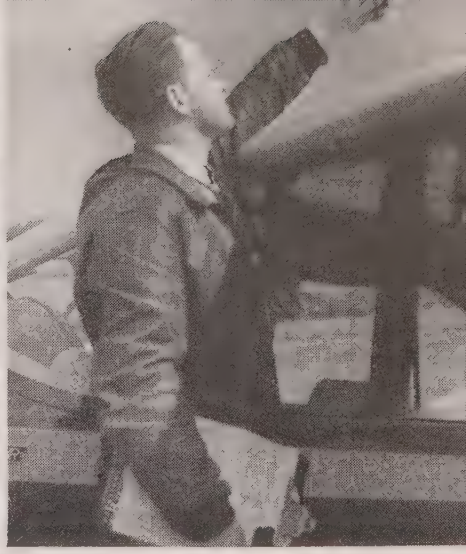
RACE STARTER, in this case Tony Little, waved planes off at one-minute intervals. Race course was 300 miles long.

Competing pilots had to fly their ships on course which took them over so-called pylon airports, then back to Wings

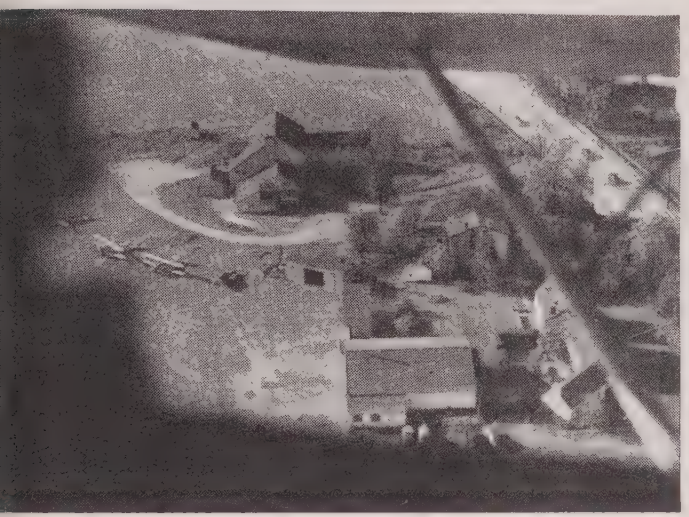


SPEED was essential, so pilots "faired" with scotch tape

GAS is good to last drop, so pilots topped off tanks from bottles, after pumps



CHECK was made to be sure no pilot had chilled his fuel

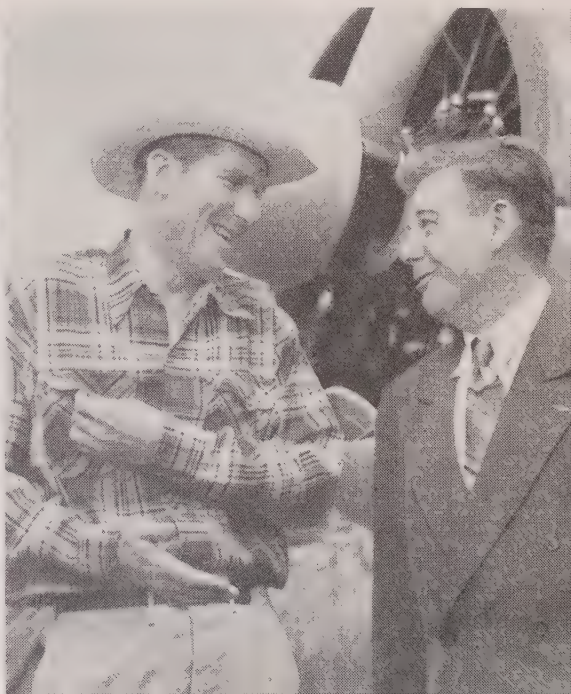


PYLON AIRPORTS weren't always easy to find. Observer on ground noted planes' licenses as they flew over

AT LAST . . . a personal plane race that is fun and safe! Called the Philadelphia Regatta, it is run twice each year at Wings Field. The formula was devised by Tony Little, ardent flying club member of Philadelphia's Pylon Club. Pilots compete only in their plane category, and points are awarded on basis of shortest elapsed time at lowest gas consumption. The exact course of the race is not given out until an hour before take-off time. Competing pilots then go to work with their charts; gas is pumped into airplane tanks; pilots take off and fly the circuit (usually 300 miles with start and finish at Wings Field), return to field where elapsed time is established and gas consumption is figured on basis of quantity of gas needed to re-fill the tank. Check is made to be sure pilots haven't chilled gas to permit greater poundage.

RACE OVER, competing planes had gas tanks refilled so that their total gas consumption could be judged from amount the tanks took

RACE BOSS Tony Little chats with twin-engine race winner Pilot Arthur Godfrey



NEW... on the wing

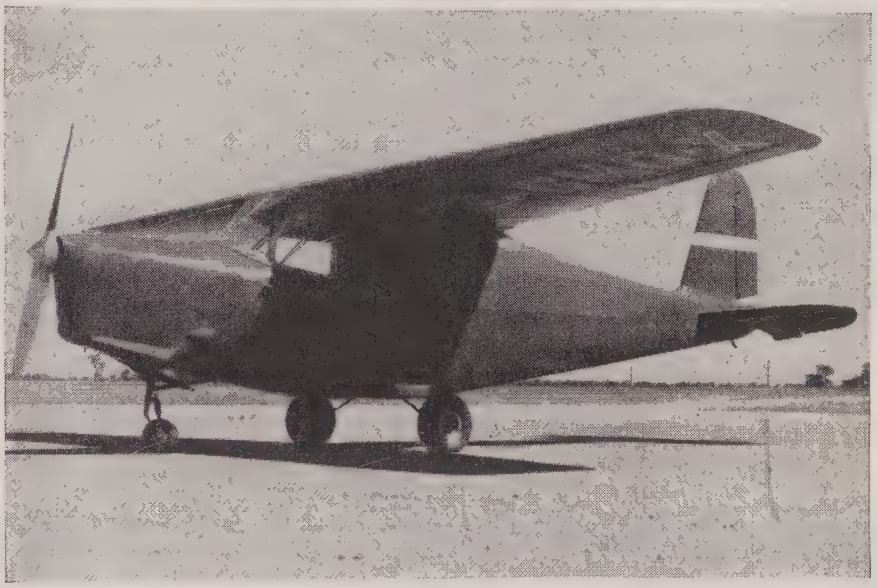
JET AIRLINER, built by A. V. Roe, Canada Ltd., is designated Type C. Powered by four *Derwent* jet engines paired in twin nacelles, the airliner *(right)* is expected to cruise at 400 mph at 30,000 feet. It will carry from 36 to 40 passengers and is classified as a short/medium range jet transport. The prototype is now undergoing flight tests.

GREAT BRITAIN'S 127-ton *Brabazon (left)* is called "world's largest landplane." Powered by eight engines, the big ship has been designed to carry 100 passengers non-stop between New York and London. For trip of this sort, the *Brabazon* must carry 13,500 gallons of fuel. Cruising speed of *Brabazon* is expected to be about 250 mph.

PERCIVAL PRINCE is a roomy little high-wing transport designed specifically for feeder-line operations. It seats either eight or 10. Powered by two Alvis *Leonides* of 520-hp each, the *Prince* has a top speed of 210 mph at sea level, and cruises at 177 mph at 10,000 feet. This feeder-line plane *(left)* is presently in very limited production.

NAVY'S SUPER patrol plane is the Consolidated Vultee XP5Y-1 now nearing completion at Consolidated's San Diego plant. Four Allison prop-jet engines will give the XP5Y-1 more power per pound of airplane weight than some modern fighters. The big patrol plane *(right)* grosses more than 60 tons. Model shown here is one of two being built for Navy. Flight tests are scheduled to begin this month.

PIPER CLIPPER, the biggest (performance-wise) little plane in the Piper line, has been licensed for float operations. Equipped with Edo floats and completely corrosion-proofed, the Piper *Clipper (above)* sells for $4907.18, and is one of the lowest priced seaplanes in its class. Powered by 115-hp Lycoming, it cruises at 100, has range of over 400 miles.



ITALY has come up with a trim twin-engine amphibian *(below).* Designated the P. 136, this amphib carries pilot and four passengers, plus 220 lbs of baggage. Powered by two Franklin engines swinging Hartzell props, the P. 136 cruises at 150 mph and has a full-load range of 400 miles. The ship is fully instrumented and these are of U. S. manufacture.

CANADA'S contribution to the private plane field is this four-place plane *(above)* built by Found Brothers Aviation Co., Ltd., Malton Airport, Toronto, Canada. Called the F.B.A.-1A, it is powered by 145-hp Gipsy Major engine. While the prototype has been flown, nothing in the way of performance figures are available at this time.

FLIGHT ENGINEER on globe-girdling B-50 was Capt. David B. Parmalee, shown here in derriere—first position on B-29

NERVE CENTER of big bombers is the Flight Engineer's station. He operates all engine controls for the pilot

POSITION of Flight Engineer's station permits him to maintain a visual check of plane's engines at all times

HE WHO FLIES BACKWARDS

By J. WESLEY NEAL

WHILE flying a navigational training mission one dark night in 1943, I became lost. In those days, I had never heard of maximum range or cruise control. Standard lost procedure, so the book said, was to throttle back, reduce engine rpm, lean the mixture and pray. Fully aware of the gas-gulping characteristics of my two R-2850's, I lost no time in putting into practice these measures—and especially the latter.

Ironically, the hit-and-miss steps I employed are all a part of the present-day method used to gain maximum range, with one exception. Aircraft today carry charts which show the exact rpm for a given power setting. Such precision may add one hundred miles to the range of an airplane. Anyone who has floated around out there between Mother Earth and the sun knows that one hundred miles can seem awfully important sometimes. Especially when—shall we say—there is some doubt as to position. But let's examine those cruise control charts. How they found their way aboard modern airplanes presents an interesting tale.

The exact point where cruise control appeared as a scientific factor in long-range flight is somewhat difficult to determine. With the development of large aircraft, the United States Navy and some of our domestic airlines first began serious experiments with maximum range flight in the late 30's. But we were not alone in this field of aeronautical research.

As a matter of fact, in the very year that World War II broke out in Europe, two Russian aviators predicted that a non-stop, round-the-world flight was imminently possible. Gromov and Mikhailovich who, in 1939, startled all nations by their flight from Moscow to San Diego, were asked by *(Continued on page 50)*

SUPERFORTS, shown here ready for take-off against Japs in war in the Pacific, were first planes to carry Flight Engineers. These men-who-rode-backward developed cruise control charts, reduced plane losses due to lack of fuel

USS LANGLEY, a converted collier, was Navy's first aircraft carrier. In 1921, a small group of Navy flyers go aboard the *Langley* to learn how to take off and land on her 65-foot deck. Jonathan Scott is one of this group

PEARL HARBOR is attacked in 1941. Prior to that Scott is sent to Washington to make friends for aviation. He argues with wrong man, is banished to Panama, later reassigned to *Saratoga*, then as instructor at Annapolis

SCOTT, when Pearl Harbor is bombed, is on duty aboard the *Enterprise*. Because of his know-how, he is made Operations Officer. His men attack Jap forces near Midway. Scott sweats out their return *(below)* to the ship

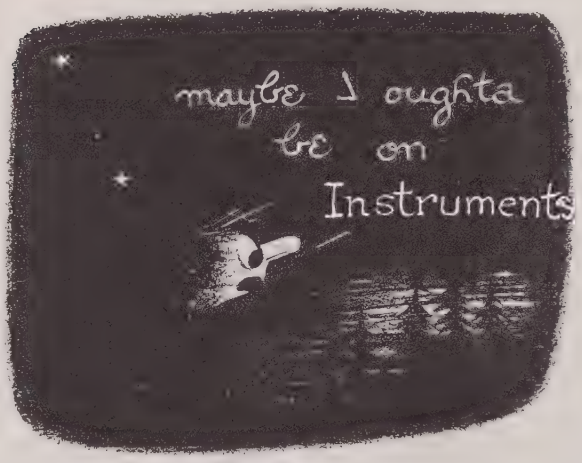
WARNER Bros. has come up with a Naval Aviation motion picture that, in our estimation, surpasses about everything of that nature ever done by Hollywood. The film traces the growth of Naval Aviation from the days of the Langley, the Navy's first carrier, to the end of World War II and victory in the Pacific. The main action of the story is the carrier's role in that victory. Dramatic and intense, much of the film is actual footage from wing cameras of fighting planes in combat action in the Pacific in World War II. Gary Cooper plays the lead as Jonathan Scott. If you're an aviation enthusiast, don't miss this picture that factually portrays the vital part the aircraft carriers and their fighting men played in defeating the enemy and winning the war in the Pacific.

WAR OVER, Capt. Scott brings his wrecked ship back to base, is retired as Admiral, watches jets take the air

DILBERT

By S. H. Warner and Robert C. Osborn

Visibility Zero Judgment Zero – Dilbert decided he needed some practice in night flying. He got a lot of experience in a very short time. Within two minutes after take-off, he crashed into a grove of pines.



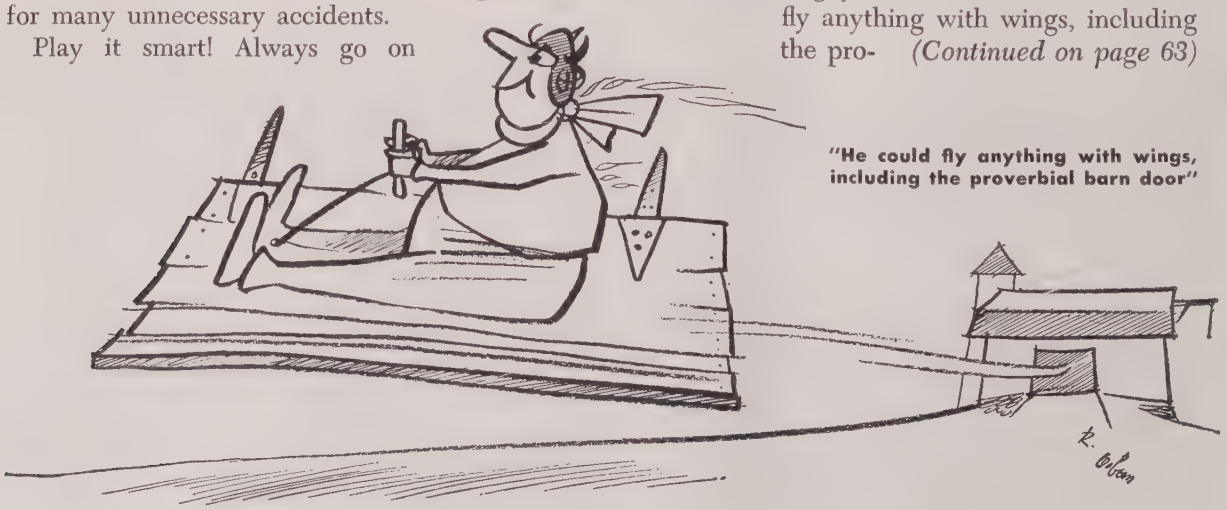
Dilbert's alibi was that the weather had double-crossed him. There was a 10,000-foot ceiling, but when he left the lighted airport behind him, it was so dark he was unable to see anything. With no outside reference points, he couldn't judge the attitude of his plane—so he started to shift to instruments. Just about that time, he hit!

Many pilots seem loathe to go on instruments as long as any possibility remains on flying contact. This is a dangerous habit, one responsible for many unnecessary accidents.

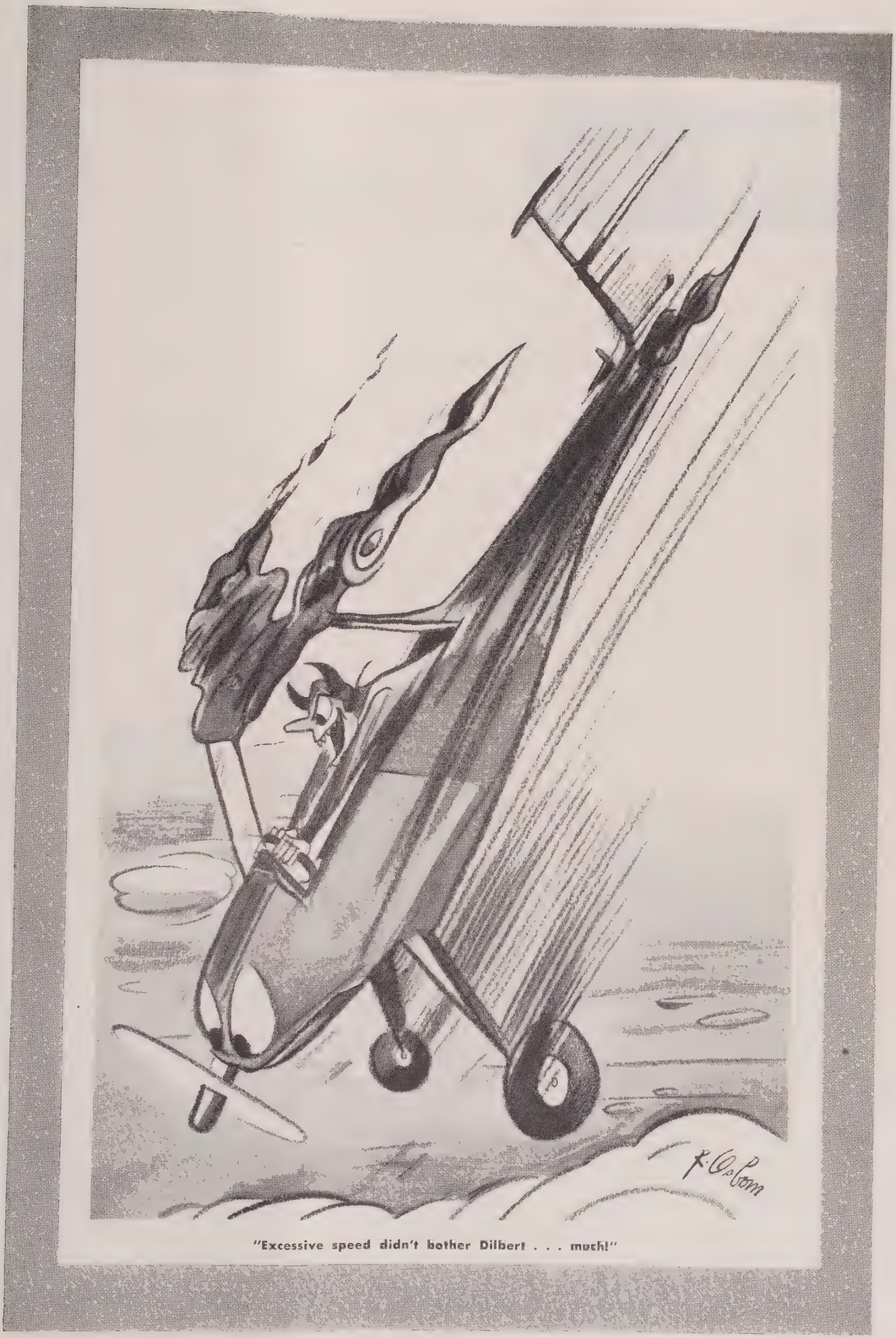
Play it smart! Always go on instruments as soon as there is any possibility of visual references being blotted out. It is much easier to shift from instruments to contact than to have to make a sudden shift to instruments after contact is lost, especially under adverse conditions. An occasional glance will inform you when you can go back to contact flying.

Of course, if you are not a qualified instrument pilot, none of this refers to you. In that case, you have no damn business ever allowing yourself to get into a position where you might lose visual contact.

Some Clouds Are Full Of Rocks—By his own admission, this guy was a *Hot Pilot.* He could fly anything with wings, including the pro- *(Continued on page 63)*



"He could fly anything with wings, including the proverbial barn door"



"Excessive speed didn't bother Dilbert . . . much!"

Operational Engineering

Service Notes : Stinson Voyager

MAINTENANCE items that might be of assistance in general aircraft operation are herein offered owners and operators of the Stinson *Voyager*. Although the basic Stinson *Voyager* design has been followed for several years by the Stinson Division of the Consolidated Vultee Aircraft Corporation, former manufacturer, and by the Stinson Division of the Piper Aircraft Corporation, the present manufacturer of the line, refinements in the design have resulted in differences in various accessory installations and changes in power ratings and loadings. Therefore, in considering the information presented here, make sure it refers to the model Stinson you fly.

Ground Operations—Routine Servicing

Fuel Tanks: Beginning with the 1948, 165-hp *Voyager*, one 25-gallon tank was installed in each wing for a total of 50-gallons of fuel. Previous 165-hp *Voyagers* (1947) and the Voyager 150's had one 20-gallon aluminum alloy tank in each wing, but only 18 gallons in each tank was available for use, for a total of 36 gallons of fuel.

Oil Tank: The wet-sump type engine carries all its oil in the crankcase. The 165-hp Franklin engine has a capacity of nine quarts of oil and requires a minimum of five for safe operation, while the 150-hp Franklin, the same engine with lower power rating, has a capacity of eight quarts of oil and requires at least a minimum of four. The oil-filler cap for either engine is on top of the engine between the two rear cylinders and is accessible from the right side of the engine. The oil dip stick, for measuring purposes, is on the top right side of the crankcase inside the baffles.

The engine oil is drained through a safetied drain valve in a line carried to the rear of the engine compartment. Drain oil at its normal operating temperature. *Be sure to re-install safety wire on valve slide after draining the oil.*

Landing Gear: Each main gear consists of a tapered chrome molybdenum beam hinged to the fuselage side with a rotating bronze bushing. The upper end of each beam is connected to spring-oil shock absorber struts that join the beams to the center of the fuselage. The tail-wheel unit is a full-swiveling, solid-tired unit mounted on a leaf spring that is attached to the fuselage.

The main gear shock absorber struts are reached through the cover under the front seat in the cabin. After each 100 hours of operation, remove the bleeder screw at the top of the strut wall and add petroleum-base hydraulic fluid, equivalent to AN-VV-O-366b, slowly through the filler plug at the top of the piston until fluid flows out the bleeder hole. Check the bleeder hole with a wire to make sure it is clear; wait until fluid stops coming out of the bleeder and then re-install the bleeder screw. Always fill the struts with the full weight of the airplane resting normally on the wheels. If it is necessary to fill the struts too often, the O-Ring seals at the piston end of the strut cylinder may be deteriorated and should be replaced.

Battery Servicing: The battery installation was changed on the 1948 *Voyager* from its former position under the pilot's seat to a rack forward of the firewall.

Battery maintenance on models with the firewall rack is obvious. To service batteries located under the pilot's seat in planes previous to the 1948 *Voyager*, lift up the handle at the right of the pilot's seat, slide the seat full aft, remove the track stop bolt, slide the seat forward, lift the front part of the seat up and tip the seat back. The 1946 *Voyagers* were factory equipped with a 12-volt Exide, while the 1947 had a 12-volt Willard as standard equipment. Keep the electrolyte at the proper level.

For removing the battery from under the pilot's seat, after releasing the battery case cover clips and removing the cover, disconnect the positive battery lead and then the negative. Pull the leads out of the case in order to allow space while lifting the battery. For replacement, reverse the steps, being sure to keep the negative battery terminal to the right side of the airplane when lowering the battery gently into the case.

Lubrication: See chart and accompanying list of lubricants and periodic inspections. Aileron, flap, rudder and elevator hinges on 150 *Voyagers* require lubrication with AN-O-6a, general purpose oil, every 25 hours. Later model *Voyagers* require no additional care, except keeping them clean.

Power Plant—Tips and Tolerances

The Franklin 150 (6A4-150-B2) and 165 (6A4-165-B3) engines are essentially the same, except for changes in carburetor and power ratings. The rated engine speed of the 165 is 2800 rpm, while for the 150 it is 2600 rpm. The Franklin 165 is equipped with a Marvel MA4-5 carburetor, dual Scintilla S6RN-21 magnetos and Auto-Lite AH-4 or Champion J-10 spark plugs. The Franklin 150 uses a Marvel-Schebler MA-3SPA carburetor, dual Eiseman LA-6 magnetos and Champion J-10 spark plugs or equivalent.

Ignition System: Maintenance is conventional. Spark plugs should be tightened to a torque of from 12 to 15 foot-pounds. Heli-Coil spark plug bushings are replaceable in case the threads are damaged.

Carburetor: The strainer is installed at the fuel inlet to catch any dirt or other matter which might pass the main strainer at the firewall. Idling speed is approximately 600 rpm. The idle adjusting screw for controlling speed is on the throttle lever at the carburetor. The idle mixture control is a knurled screw above the mixture control lever. Slight clock-wise movements of this screw will lean out the mixture. This adjustment should not be made unless re-check tests show that the engine is running too lean or too rich at the proper idling speed.

Flight Controls—Tension and Travel

Increase in maximum gross weights for succeeding models of the *Voyager* were facilitated by changes in the fuselage and wing structures. Fuselage changes were accomplished by tubing changes, while the wing beefing was in the nature of heavier fittings. Control changes from 1947 to 1948 were in the use of a larger rudder and a different system for the rudder trim tab, with the '49 system is the same as the '48.

Aileron Control System: The ailerons are in neutral when the trailing edges are one-quarter of an inch below the wing trailing edges. Travel limits are 23° to 25° up and 11° to 13° down. Fixed aileron trim tabs may be ground adjusted in a range of up to 26° up or down from neutral. Cable tension in the aileron control system is 42 to 47 pounds.

Flap Control System: Travel limit, fully extended, is 32° to 34°, while the intermediate position is 26° to 28°. Cable tension for the flap cables in the wing is 22 to 25 pounds, which puts the tension for the fuselage cable in the system at 44 to 50 pounds.

Elevator Control System: Travel limits, with flaps up, are 16½° to 17½° up and 19½° to 20½° down. With flaps down, limits are 25° to 26° up and 19½° to 20½° down. When the flaps are in the "up" position, the up-travel of the elevator is limited by a stop on the push-pull tube which connects the control column to the elevator system cable bellcrank. The stop limits travel by engaging the lower arm of the flap-lever control assembly. Cable tension for the elevator system is 100 to 110 pounds. Trim tab tension is 10 to 20 pounds.

Lubrication Chart for Stinson Voyager

SYMBOLS USED IN LUBRICATION CHARTS

The following symbols are used in lubrication charts to indicate the operational periods at which various parts of the airplane require lubrication:

= 25 Hours

= 50 Hours

= 100 Hours

The following symbols indicate the method of application and the type of lubricant to be used at the intervals specified above:

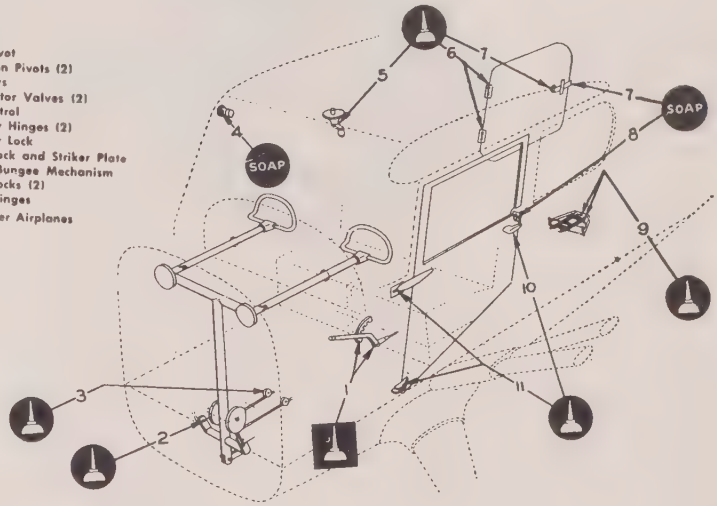
= Oil Can
(Use Oil, Specification No. AN-O-6a)

= Grease Gun, Zerk Fitting
(Use Grease, Specification No. AN-G-15)

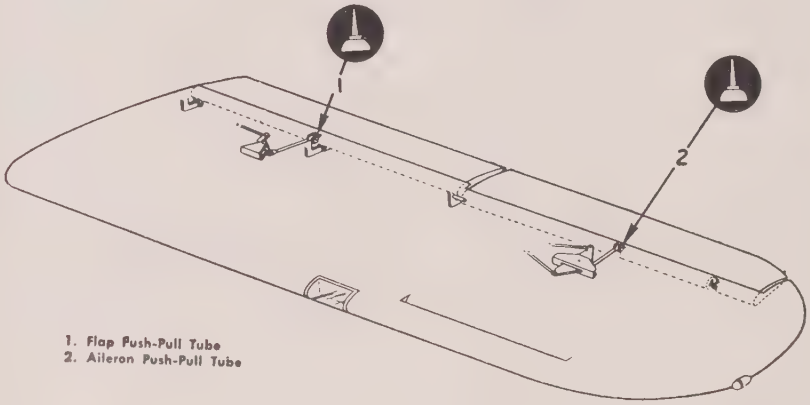
= Pack, Hand or Paddle
(Use Grease, Specification No. AN-G-15)

1. Flap Lever Pivot
2. Control Column Pivots (2)
3. Aileron Pulleys
4. Cabin Ventilator Valves (2)
5. Trim Tab Control
6. Baggage Door Hinges (2)
7. Baggage Door Lock
8. Cabin Door Lock and Striker Plate
*9. Rudder Trim Bungee Mechanism
10. Cabin Door Locks (2)
11. Cabin Door Hinges

*On 165 Horsepower Airplanes



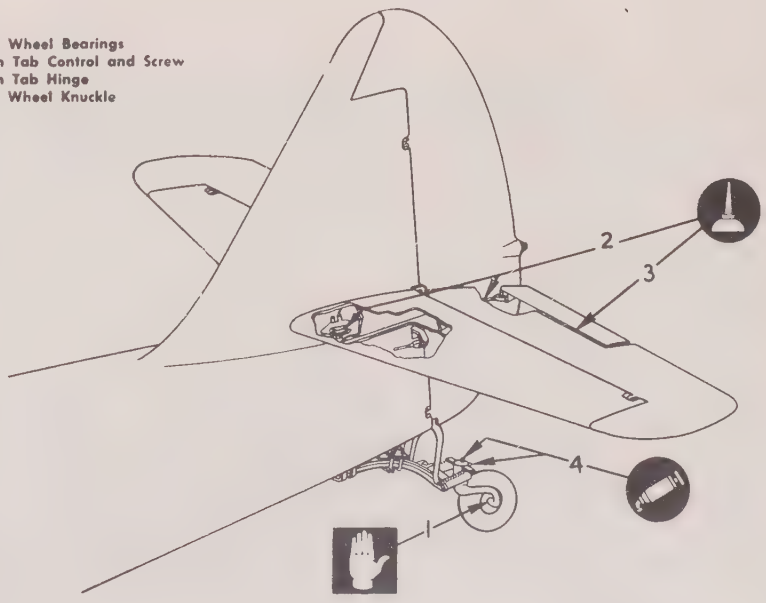
Cabin Compartment Lubrication



1. Flap Push-Pull Tube
2. Aileron Push-Pull Tube

Wing Lubrication

1. Tail Wheel Bearings
2. Trim Tab Control and Screw
3. Trim Tab Hinge
4. Tail Wheel Knuckle



Empennage and Tail Wheel Lubrication

Rudder: Travel is controlled by fixed stops, and the control system differs according to the year of manufacture. On later model planes the rigging of the rudder and elevator trim-tab control are effected by the rudder trim-control system.

General—Facts and Figures

Gross loads of Stinson *Voyagers* differ according to powerplant, year and model, and loading limits approaching maximum must be checked carefully since 1946 planes are stressed for lower gross loads than later *Voyagers*. The *Voyager* 150 has a gross weight of 2150 lbs; the 1947 165 *Voyager* is licensed for 2230 pounds and the 1948 and 1949 *Voyager* for 2400 pounds. Floatplane and ski-plane versions also differ according to the licenses.

Changes also took place in the heating and ventilating system between models, with successive improvements, including changes in outlet ports in the cabin along with an improved cabin heater. Since heated air is ducted to the cabin from a muff on the left exhaust stack, routine engine inspections should always include a check of the muff and stack for possible cracking. Exhaust fumes in the cockpit in flight may be traced to this source in any type of plane.

According to CAR's, all repairs, adjustments and replacements that are other than routine must be made by or under the direction of a licensed A & E mechanic. None of the information contained here is intended to supersede directions contained in official manuals or service bulletins.

C.A.P. News from Hq.

State Training Search

Pittsburgh, Pa.: The 31st Wing Command of the Pennsylvania Civil Air Patrol activated a training search of the entire state of Pennsylvania recently in just four hours.

The state was divided into two zones of Tactical control: 1st Tactical out of Allentown Country Airport, and 2nd Tactical out of Headquarters at Allegheny County Airport at Pittsburgh.

Typical of an area searched was that of Group 6 in Western Pennsylvania. That area, 9000 square miles, was divided into 74 sections, each measuring 9 by 13 miles. Each pilot in Group 6 was assigned one single section to search.

The Group Commander, Major E. K. Long, was alerted by radio from Air-Sea Rescue Headquarters at Westover Field, Massachusetts. Upon the receipt of that alert, a carefully organized "fan-out" phone call plane was set into motion which notified all pilots to proceed immediately to Headquarters at Allegheny Airport.

The search was entirely successful, and proved again that the CAP can efficiently do its part in any emergency it might be called upon to face.

Major E. K. Long, Capt. C. E. McKee, Jr., and Capt. W. G. S. McKee were in charge of operations out of Allegheny Airport at Pittsburgh.

CAP Men Save Two Couples

Fort Lauderdale, Florida: Mr. and Mrs. Charles Fischer and Mr. and Mrs. Ludwig Throm are indeed indebted to the Fort Lauderdale Civil Air Patrol. On a fishing trip aboard a 26-foot skiff near Jupiter Lighthouse between West Palm Beach and Stuart, the two couples became stranded when the engine of their boat conked out and wouldn't start again. Some 24 hours later, when the young couples had not returned, a search was instigated by the Coast Guard and the Civil Air Patrol. First to spot the drifting boat with its worried occupants were Norman Kleinsch and Joe Dunaway of the Ft. Lauderdale CAP. The two CAP men returned to their base, reported their discovery of the helpless boat and its position. With this information, a Coast Guard cutter was able to reach the couples, take them aboard and return them to shore and safety. Although the couples had had nothing to eat but a little raw fish and very little water, they were none the worse for wear, but very grateful to their rescuers, the Civil Air Patrol.

Submarine Tracking

New York, N. Y.: The first combined Navy-Civil Air Patrol war maneuver since the end of World War II took place recentl over the Atlantic Ocean off Long Islan New York.

Conducted under strict wartime cond tions, with a Navy submarine taking th position of the attacking enemy whil planes of the CAP defended the coast water, 15 squadrons of the Southern Dis trict of the CAP's New York Wing pu planes in the air. It was their job to ferre out and simulate destruction of the sub marines.

The CAP planes flew out of Grumma Airport, Bethpage, L. I., and were unde the direction of Lt. Col. E. C. Isom, L Col. J. F. Crowley, Major Eddie Lyons and Major Lester L. Wolff.

Only real excitement of the operatio came when two CAP officers, flying low level over the ocean, had the engine o their plane quit, forcing them to ditch th ship in the water. Fortunately, a Coas Guard PBY was in the vicinity and th two men were picked up a few minute after hitting the water. No one wa injured, although the plane was a com plete loss and the pride of a couple c pilots was dampened.

Here an' There

New York, N. Y.: The New York Wing o the Civil Air Patrol has on hand a supply of "Glow-Lite" Civil Air Patrol automobil identification plates. These plates ar available at 35 cents each, or $3.50 pe dozen. Requests should be submitted direc to New York Wing, Civil Air Patrol.

Cut Bank, Montana: Cadet Glenn Miller 17, of Great Falls, Montana, left fo England recently aboard an Air Forc plane. The cadet was awarded the tri through his activities in the Great Fall CAP squadron. Cadet Miller is one of 2 cadets in the U. S. to make the tri under a cadet exchange program worke out with the English equivalent of th Civil Air Patrol.

NEW YORK WING of Civil Air Patrol recently participated in first combined Navy-CAP maneuver since end of the war. Here commanding officers plan operations from base at Grumman

CAP PILOTS Kleinschmidt and Dunaway get congrats for rescue job by Chief M. Smith

CAOA REPORT . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. The CAOA headquarters are located at 444 Madison Avenue, New York 22, N. Y.

New Secretary

Following the resignation of C. B. Colby, the Executive Board of CAOA appointed Colonel Nathaniel F. Silsbee, well-known aviation writer and editor, to the position of Secretary of the Association.

"Niel" Silsbee's interest in aviation goes back to the International Aero Meet at Squantum, Mass. in 1910, and included a year and a half in the U. S. Air Services in World War I.

He has been writing aviation since the mid-thirties, including aviation columns for various newspapers, the nationally syndicated series "Wings Over America" (1940), and articles in aviation magazines.

During World War II Silsbee served for four years in the AAF, from Captain to Lt. Col., including two years as Technical Research Officer, Hq. AAF Public Relations, and two years in the Intelligence Division of the Air Staff.

Since the war he has held the position of Technical Editor of SKYWAYS magazine for two years, and Managing Editor of Aero Digest for two years.

Niel Silsbee was born and educated in Boston, Mass., and now lives in Merrick, L. I. He has one son and four step-sons.

CAOA Forum

This is the first issue in which we have been able to offer a complete report on the second annual CAOA forum held in Washington, D. C. on August 3, 1949.

Registration began at 9 o'clock and shortly after 10 o'clock CAOA Chairman, William B. Belden, opened the forum at the Hotel Statler.

Airport Service Required

The first speaker was Mr. Robert Aldrich, Director of the Minneapolis-St. Paul Aviation Authority.

In his introduction of Mr. Aldrich, Mr. Belden pointed out that last May he attended the Airport Operators Council meeting at Denver, Colorado, as a speaker, and at that time presented to the airport operators present, an inventory of the things that executive aircraft operators desired from airport managers to make their ports better hosts to the itinerant executive. CAOA felt it only fair that a representative from the Council be invited to our forum to give the other side.

The speaker was responsive and he genially pointed out that AOC not only welcomed but desired comments and suggestions relative to airport services.

Mr. Aldrich recalled the old axiom of the "squeakiest wheel getting the most grease" and indicated that the operators of executive aircraft *should* point out the type of services required. He added that our needs are the deep concern of the Council and only through an articulate CAOA membership can they know of conditions that should be remedied.

Mr. Aldrich pointed out that it was the duty of the airport manager to offer the best possible services to visitors of all categories, and that he was the one with whom to register complaints of any type, be it regarding refueling, personnel, restaurant service, washrooms or tower.

In conclusion, Mr. Aldrich pointed out that it was the function of the Airport Operators Council to attempt to correct such situations as fast as they were brought to their attention.

Executive-Aircraft Insurance

The next speaker's topic was insurance for the corporation-owned aircraft. Mr. Gordon Sleeper, aircraft insurance expert from the Frank B. Hall & Co. Inc. of New York, pointed out that there is no *one* insurance plan for any *one* executive aircraft. Each plan must be hand tailored to fit the aircraft for which it is intended.

His interesting talk covered such points as the importance of reading *all* the fine print on your aircraft insurance policy, the fact that an accident will make it necessary for you to re-establish your insurance and pay another premium based upon the new situation, the great chance of on-the-ground damage and liability risks, and the importance of care in the selection of pilots.

Mr. Sleeper cited one instance wherein a pilot was hired on a friend-of-a-friend recommendation. This pilot was investigated as usual by the insurance company approached to handle the coverage for the plane involved. This pilot was found to not only *not* hold the ratings he had indicated but to have a reputation for taking long chances, being careless to a point of incompetency, and having already been involved in more than one accident. Needless to say this pilot was discharged at once, for with him as pilot, insurance of the aircraft was impossible.

Gordon Sleeper further pointed out that each owner actually makes his own rates through his reputation for good maintenance, careful selection of pilots and good operating practices.

Problems of Air Traffic

Following Mr. Sleeper's talk the chairman introduced the Deputy Administrator of the Civil Aeronautics Administration, Mr. Fred B. Lee, who was a speaker at the 1948 forum.

Mr. Belden pointed out that last year Mr. Lee had withstood considerable bombardment from the floor and with a fine display of sportsmanship had promptly agreed to return as a speaker this year. CAOA was particularly glad and fortunate to have Mr. Lee back this year for as usual his talk was of unusual interest.

Mr. Lee gave a very detailed account of the CAA's plans for future handling of air traffic, yet pointed out that with the vastly increased speeds and numbers of modern aircraft unforeseen problems were already being encountered.

For example, he pointed out that jet aircraft alone posed considerable problems not only because of their speed but for the fact that they are difficult to "stack up" and hold at a point until the landing pattern was open for a landing.

He described the Civil Aeronautics Administration's work on a cross-range computer that would enable one to fly any arbitrary course at any angle, not just to and from points, their work to reduce holding tie-ups at terminals, to obtain automatic transmission, and to obtain better radio communications.

The Deputy Administrator predicted that by 1954 all low frequencies with their problems would be eliminated in favor of the higher ranges where better all-weather communications are possible.

Mr. Lee assured the forum that the CAA wants to treat executive-aircraft operators the same as the airlines. Mr. Lee stated that the matter of "airline minimums" had often been misunderstood by some executive pilots.

NEW CAOA SECRETARY

Nathaniel F. Silsbee, Colonel USAFR, will try to keep things moving at N. Y. headquarters of our Association

THE HEAD TABLE at forum luncheon, including all but one of the speakers. Left to right: "C. B." Colby, Gordon Sleeper, J. Fred Henry, Fred B. Le... Captain Bill Odom, Chairman William B. Belden, Brig. Gen. James W. Spry, Joseph T. Geuting, Jr., Don Mockler, Cole H. Morrow, Walter C. Pagu...

He said that there were no actual "airline minimums," as such, as a blanket privilege of the airline pilots. Each airline pilot must be checked out for a minimum for a certain terminal in a specific type of aircraft, and that minimum applies only to that pilot at that terminal in that type of ship. The fact that airline pilots have been granted lower minimums for a certain terminal port does not mean that other pilots may not be given a waiver for that minimum at that field in a certain type of ship if he can qualify. (He mentioned one terminal at which there were 15 different sets of minimums in force for different pilots and types of ships.)

This can be done for any executive pilot who can meet the requirements, but (as in the case of the airline pilots) that minimum will only be good for that field by that pilot in the ship in which he qualified for his minimum waiver.

He pointed out that any airline pilot landing at a strange field, or in another type of ship than the one in which he was granted his waiver for a lower minimum, *must* observe the higher minimum exactly as an executive pilot who has not qualified for a waiver. (This should do much to clear up the confusion over the seeming favoritism in "granting" lower minimums to airlines.)

All in all, Mr. Lee's talk was optimistic and exceedingly interesting to those present. It was felt that with Mr. Lee in his position of importance with the CAA, the interests of CAOA and all executive-aircraft operators would receive a maximum of understanding and cooperation.

Aircraft Protective Maintenance

At the conclusion of Mr. Lee's talk the forum was addressed by a distinguished speaker from the United States Air Force, Brigadier General James W. Spry, Chief of Maintenance for the Air Force. General Spry introduced the subject of protective maintenance, an angle of aviation often overlooked in importance.

General Spry pointed out that aircraft had to be designed with better access to parts that require inspection and servicing, and made easier and more economical to maintain.

Although the figures given by the General do not apply to the average executive aircraft (26 millions to maintain and operate B-50's) the theme of General Spry's enlightening talk did apply to executive aircraft—that an aircraft is really no better than its maintenance, and that maintenance should be a protection against rather than a correction of a bad condition. We were fortunate to have had the General with us as a speaker and the forum found the Air Force's problems of maintenance highly interesting.

Capt. Odom Accepts Certificate

A recess was declared at the conclusion of General Spry's talk while the room was converted for the forum luncheon.

Toward the close of the luncheon, M... Belden rose to introduce the guest speake... stating that a formal introduction wa... hardly needed in this case, the speake... being so well-known as a round-the-worl... and long-distance record holder. He wen... on to say that first of all, however, he ha... a very pleasant little ceremony to perform... presenting the luncheon speaker, Captai... William P. Odom, with the first Honorar... Membership in the Association.

The certificate, prepared especially fo... the occasion, was read to the forum. I... certified that William P. Odom had bee... elected to Honorary Membership in th... Corporation Aircraft Owners Association... Inc., by unanimous vote of the Board o... Directors "in recognition of his outstandin... accomplishments as an airman and for hi... promotion of the use of aircraft as an ai... to industry."

Captain Odom accepted the certificat... from the Chairman of CAOA'S Board o... Directors and thanked him for the hono... of being CAOA's first Honorary Membe... stating that he considered the associatio... an important part of aviation's progres... and one that was bound to become mor... and more important as the use of aircra... in industry becomes more universal.

Odom Recounts World Trips

From acceptance of the certificate, Bil... Odom turned to his subject as luncheo... speaker.

Somewhere in the hiliarious shuffle tha...

MR. ROBERT ALDRICH stressed interest of Airport Operators Council in CAOA suggestions

BRIG. GEN. JAMES W. SPRY, USAF, strongly emphasized the value of protective maintenance

"CAA wants to treat operators of executive planes same as airlines" stated Dep. Adm. Lee

›wed, the subject seemed to have been placed, but no one seemed to care.

Captain Odom launched into a modest highly entertaining description of his ous round-the-world record flights and most recent non-stop flight from Hawaii Teterboro, New Jersey.

Apparently Bill Odom's various flights e been as full of anecdotes as they e of careful planning and expert air-nship, and none of the anecdotes ered by his telling. He made his record-aking round-the-world flights in the rnolds "Bombshell" and the flight from waii to New Jersey in the stock model ech *Bonanza* sound so ridiculously ple that it was hard to realize the vast ount of preparation and expert piloting l navigation behind them that made m "routine."

The Captain, long a great believer in use of executive aircraft as an aid to ustry, has done much to establish and mote modern aircraft as a reliable, safe l actually economical piece of business l industry equipment. His talk ended too soon.

Cooperation

At the close of the luncheon, the Chair-n called upon Mr. Joseph T. Geuting, nager of the Personal Aircraft Council the Aircraft Industries Association.

Mr. Geuting's subject was "CAOA-AIA, tners in Progress." He expertly pointed how closely CAOA and AIA works ether to promote the use of executive craft. Mr. Geuting's statement that, olution and not revolution is the for-la by which our industry will produce r by year, as we have in the past, craft of increasingly better perform-e and greater utility" pretty well sums the thinking of a majority of those in ation.

Mr. Geuting's talk was well received and points he touched upon were of especial erest to CAOA members.

ng Exec Passengers

Following Mr. Geuting, the Chairman led upon Mr. Cole H. Morrow, CAOA rector, and Assistant to the Vice Presi-nt of the J. I. Case Company. Mr. rrow's subject was "Flying the Execu-e Passenger," and he described the que course of training the Case Com-ny prescribes for its executive pilots in gentle art of flying their executive sengers so they will be relaxed and nfortable during the flight.

The J. I. Case Company makes it a ctice to let the passengers, many of om have never flown before, know all ut the flight, why it is flown a certain y, how the pilot operates the aircraft l why certain things have to be done ing the trip. The latter includes such ple but mysterious-to-the-passenger gs as changing propeller settings, tching tanks, checking maps, and ad-ing instruments enroute.

The J. I. Case executive also pointed that as business competition becomes er, the aircraft should not be con-ered a liability but an asset in view of greater territory that can be covered offset the new competition.

Safety in Flight

The last speaker of the forum covered the subject of greatest importance to all operators of executive aircraft, namely, safety in flight.

Mr. Walter C. Pague, Chief Pilot for Armco Steel Corp., and Chairman of the Association's Technical Committee, pointed out that flying safety was really a matter of knowing accurately your own capabilities as a pilot. Knowledge of your aircraft, important as it is, is overshadowed by knowledge of your own skill as a pilot, gained through experience, Mr. Pague stated.

He emphasized the point that no matter how experienced a pilot might be, there were no two ways about instrument flying. You either know it or you don't, and if you have not passed an instrument check recently enough to give you assurance that you can safely fly during IFR conditions, it is far better that you take the train, adding that the pilot who really knows the score still prepares for instrument flight.

Armco's Chief Pilot also emphasized that you should never encounter really rough going *if* you have planned your flight with care, checked the weather accurately and not overstepped the capabilities of either yourself or your aircraft.

Mr. Prague's caution to the pilots at the forum was to give their executive passengers a good ride, for on *their* reaction to the flight depends their future use of the aircraft and incidentally assurance of the pilot's continued future employment.

CAOA Pilot Queries and Answers

Upon conclusion of Mr. Prague's very worthwhile remarks, Mr. Belden turned the forum over to Mr. C. B. Colby, the Association's Executive Secretary who served as moderator for the discussion period that followed the program of speakers.

From this point on, questions from the floor were directed at those of the speakers who remained for the discussion period. Their answers amplified many of the earlier talks.

Mr. Aldrich, in answer to questions, suggested that CAOA distribute "airport rating cards" for the members to fill in and forward to the Airport Operators Council regarding conditions encountered at certain airports. (The CAOA Executive Secretary met with Mr. Cyril Thompson, Executive Secretary of the AOC the following morning and the cards are now under serious discussion.)

Mr. Sleeper answered numerous questions regarding insurance, including one regarding the matter of insuring riders in executive aircraft. He stated that many companies are now insuring all members of the corporation who are liable to be called upon to ride in the plane on business. Mr. Sleeper also stated that increased use of executive aircraft not only will but *has* brought down premium rates for that type of insurance.

Miss Gloria Heath, ex-Wasp pilot and representative of the Flight Safety Foundation, introduced the subject of the weather report cards distributed to Association members some time ago and urged their continued use. Many of the forum members felt they were an excellent idea and commented upon the difficulty of obtaining accurate and up-to-date "in-flight" reports from aircraft in their area or ahead of them.

It was felt by all that the regular airlines should be more cooperative in making public their in-flight weather reports, as a contribution to general flight safety.

The formal discussion period was brought to a close at 4:30, but long afterwards groups of forum members remained in the hall renewing friendships established last year and going over in greater detail points brought out during the day.

Forum for 1950

It was the general concensus of opinion that the 1949 CAOA forum had been an even greater success than the first (1948), and all left with the feeling that it had been a day well and profitably spent. Already plans are underway for the forum of 1950 which should top the first two. If you missed the forum this year, plan on being with us next year, for you will enjoy and profit from the experience.

Chairman Belden to Captain Odom

JUST before going to press, we were shocked and saddened by the death of Captain William P. Odom. Those who heard him speak at the Forum, and many of us who have been in close contact with him can only realize with an effort that this modest and exceptionally able airman is no longer with us. His achievements in the round-the-world record flights, and demonstration of the reliability of the small executive-type aircraft in the flight from Hawaii to Teterboro live on, and have paved the way for further achievements. Bill Odom's passing leaves a big gap in the constructive forces for aviation.

Flying Photog

(Continued from page 25)

and sleazy lingerie—"something for the bride's leisure hours and play time."

"We want this stuff photographed in Phoenix, Arizona," the advertising executives said, "and we want it pronto!"

Hal winced. He was half way through a contract for the Gardner-Denver Company photographing their rock drills and other equipment at one of Utah's fabulously rich silver mines. He couldn't possibly spare more than four days.

In the very best of weather, Phoenix was a 14-hour drive, and this was January with its slick roads and snowbanks—meaning two days each way by car. By airplane he was there in about five hours the next morning. He took pictures that afternoon, the next day and the following morning. Then he loafed 24 hours and returned to Salt Lake the fourth afternoon. Another contract "saved."

In the spring, a Salt Lake accountant flew him to southern Idaho to take 21 ranch photos in the Twin Falls area and they were back before evening. About then Hal decided airplanes were here to stay. But he had a touchy problem involved in finances and utility. He could use an airplane—but not too many hours a year. If he bought wrong, he might only break even, or perhaps lose if he had some bad luck. The right choice would make some money.

Through a rather involved flying club deal that wound up in considerable confusion, he had acquired $1800 worth of used *Ercoupe* and while he liked the plane it wasn't his baby as a camera platform. For one thing, it wouldn't lug three or four cameras, two large cases of equipment and an assistant, plus their personal duffle.

He had learned that when he did fly, the basic cost per hour for gas was not important. A good many other factors influenced his choice of a BT-13. First, it was heavy and quite stable in the turbulent air over the Rockies; second, the front cockpit with canopy open gave an unobstructed shot at anything not straight down; third, it was fairly fast and had enough range; fourth, with a low initial cost, depreciation wouldn't amount to much, and being all metal it could winter out on the open range and thus save hangar fees.

In trading, he got $800 to boot and ear-marked it "gasoline funds," whereupon he quit worrying about burning 20 gallons an hour. Eight centuries buys quite a tank full of petrol, even at 34 cents a gallon.

It wasn't long until he found himself shooting pictures he hadn't known about previously, and they sold exceedingly well. In the meantime, almost every air trip turned into a Paid Vacation—something small business men rarely enjoy.

The airplane is not a main cog in his business, but it has provided a higher revenue than you'd expect, even from the figures. Actually, $3500 added to the gross annual income to $40,000 to $50,000 means only 7 per cent or 8 per cent of the volume, and the wrong kind of aerial operation could easily run that high. But once Hal tacked $200 worth of extra pictures onto five photo jobs with the ship, he wrote off the plane investment and started figuring even with the board.

FLYING PHOTOG'S favorite airplane for air shots is the BT-13. Rumel claims ship offers greater stability in rough air that prevails in mountain area of Utah, Idaho, etc. His first ship was *Ercoupe*.

It now costs him hardly $500 a year to fly the ship the 50 hours or so he needs it. That isn't very impressive until you see what happens to his *net* income. The $3,000 left becomes gravy and jumps his net 50 per cent or more. That's enough money to pay off a substantial mortgage on a home in only three or four years and is essentially what Hal's plane has meant to him.

The surprising part is the *extra* extra income the plane generated of its own accord. The gravy had gravy on it. He had estimated the ship would "save" about $1500 to $2000 a year in ordinary routine. But it did more than that—it developed some ideas of its own that Hal hadn't expected.

This began quite innocently, but was predicated on the fact that Hal was quite a "river rat" in his salad years.

An architectural firm commissioned two Utah "war-baby" housing project photo assignments. They wanted both ground shots and aerials of Dragerton and Hiawatha, towns built at Carbon county coal mines during the war and, as usual, there was a big rush.

Hal dispatched two men by car to shoot the ground pix and took off the same morning with his ace assistant, Bud Denne, to fly the aerials. Three hours later, with the aerials in the bag, they landed at Price for gas. They knew it would take until the third day for the ground crew to get back to Salt Lake by car.

Well, to cut it short, Hal had made one of those storybook white-water trips down the Colorado River by boat in his brash youth and he wanted to see what it looked like from the air. He took off for Moab where he hit the upper reaches of the Colorado's mighty gorge and they dogged down the chasm through a red-rock wonderland that defies description. After a side trip up the San Juan and around the "goosenecks" they dropped in to Goulding's Trading Post in the Navajo country and then kicked on over to Marble Canyon and one of the sweetest vacation-land air strips in the U. S. Although the boat trip had been spectacular, it was nothing to what they discovered by air—after their hair quit standing on end and they decided that the engine was going to keep running in spite of the terrain below.

The cameras were busy all the way down and back. They stopped at Marble Canyon Lodge, at Cameron on the Little Colorado, at the South Rim Lodge of Grand Canyon, at Ruby's Inn near Bryce

(Continued on page 49)

Plane Care for Flight

(Continued from page 27)

procedure. But first, let me emphasize the importance to me and to "Tex" Sallee who has insured the safety of all the flights we've undertaken together, of what we call "progressive maintenance."

This means simply that we don't wait for a 100-hour check to go over an airplane to see what may be going wrong with it. We keep checking the airplane day by day, and flight by flight. And the secret of this type of maintenance is the continual effort towards cleanliness, the pre-flight check and the "gripe sheet."

For the "gripe sheet", for instance—don't turn over a plane to a mech and say, "The engine sounds rough." Explain to him, rather, the condition under which the engine got rough, whether there was a fluctuation in the oil pressure, or whether the mags dropped off during a pre-flight check. Likewise, if the fuel pressure was low, say how low it was so the mech will know how much to adjust for. Also, if the engine was rough on the ground, but there was no drop off in rpm's during a mag check, mention that. With a knowledge of these symptoms, a mech knows immediately that the roughness may be bad propeller adjustment.

If your engine just doesn't seem to be giving out with the push on take-off and in the air but there's no drop off during a mag check, mention that, too, for it will give a mech a clue to check to see if the carburetor heat valve may be stuck, and you're getting hot air in the carburetor when you don't want it.

All these tips will help a mech to get to the root of the evil with the minimum delay. But wheel the plane into a hangar and say, "The engine's rough," and little else, and you're inviting a $50.00 bill for labor spent just looking for symptoms.

Another way to save money on your maintenance is to keep ahead of any breakdown. That's where progressive maintenance comes in. This is nothing more, after all, than a firm belief in the ancient "A stitch in time saves nine." It means when there's a cracked clamp, you replace it instead of waiting for it to break. When there's a loose wire, tighten it before it falls off. Don't let little things accumulate. If you do, then you've got a major bill on your hands. And there are mechs who, confronted with a list of minor repairs, have a tendency to add a few of their own easy-to-perform but expensive items. Don't encourage this kind of chiseler.

The beauty of all this is that a pilot himself can do a lot of these things. The only caution in this case is one against "tinkeritis"—which means checking your spark plug wires, for instance, so vigorously and so frequently that you work them loose when normally they'll stay secure and tight for hundreds of hours. But do get to know your airplane intimately.

Tex knows a pilot who, last summer, complained that while he was flying parts of the fabric started to rip off. Tex's remark at the time can fit any like situation—"I figure that was the wrong time to learn about the fabric."

Another way of keeping maintenance costs down is not to exceed engine or flight limitations. Exceeding the limits will call for earlier engine overhauls, and sometimes major repairs structurally. We had in our hangar at Teterboro recently, for instance, an old Fleet trainer which had gone through some pretty strenuous high-speed pull-outs following acrobatics. The nails on several of the ribs around the gas tanks were forced out a full half inch as a result.

Another story that Tex tells helps prove the point about plane cleanliness. It happened when he was in the Army at San Diego—it's the story of how a single loose screw killed four men in an early model of the LB-30. On that model of the light bomber, the elevator control cable fed through a gear in the cabin, a gear which was uncovered. One day the plane dove into San Diego Bay after take-off, and only the radioman and flight engineer got out alive. When the plane was hauled out of the water and inspected, it was found that the elevator cable had frozen because a loose screw had become caught in this gear. Thirty seconds with a whisk broom might have saved these four lives.

A talk with another *Bonanza* owner pointed up the desirability of cleanliness the other day. He had painted his plane. One of the major reasons he had for doing so was a desire to prevent corrosion on the metal and thereby protect its strength. Metal plus air equals oxidation—paint the metal and you stop corrosion. (There are other factors here, too, of course, including a slight but noticeable increase in speed with a painted surface.)

Dirt, oil, grease and grime, bad enough on metal, are worse on a fabric surface which will deteriorate much faster than a clean polished surface.

To keep a plane clean, you've got to wash it, of course. There are people who figure that frequent washings may be bad because water, trapped inside a wing or part of the fuselage, may rot the fabric from inside. We can't see it that way. If the owner checks to be sure that all the drain grommets are open, weekly or even daily washings will be O.K.

When you do wash, use a prepared washing solution, a soft rag or sponge, and a chamois. Stay away from kerosene or gasoline as cleansing solutions—they do the very thing that you're trying to stop—like grease spots they eat away the dope and cause the fabric to grow old quickly.

During long tie-downs two protective items can help insure maximum preservation of a good metal or fabric surface. The first is protective coating sprayed over the whole plane. Prepared paint-like solutions can be used in this way to provide an "outside hangar" for your airplane. The second device is a fabric cover for the prop and for any plastic or glass windshield area. These are cheap, and easy to secure and remove, and will save you expensive hangar rent. Without them, your plastic windshield may become discolored and marked with small checks in the sun, and your prop, if it's wooden, will absorb moisture.

If a plane is parked outside, its prop should be pulled through (eight blades—four turns) at least every three days to keep oil in the upper cylinders. If the plane is kept out longer than a month without flight time, the plugs should be

(Continued on page 46)

	Complete Aircraft			Manufacturer's Net Billing Price		
	Shipments			Shipments		
	TOTAL Jan-July	July	June	TOTAL Jan-July (thousands of dollars)	July	June
Aeronca						
Champion 65 hp	1	-	-			
Champion 86 hp	13	-	2			
Chief 65 hp	1	-	-	673	62	57
Superchief 85 hp	13	2	1			
Sedan	150	17	13			
7CCMa/	67	2	2			
Beech - Bonanza	180	26	35	1,656	238	325
Bellanca - Crusair	31	5	1	145	7	5
Cessna						
120	6	1	-			
140	38	-	-			
140A	78	22	39			
170	292	-	38	3,124	344	486
170A	33	33	-			
190	12	2	3			
195	114	10	16			
Engineering & Research						
Model E	5	-	1	119	6	30
Model G	32	2	8			
Luscombe						
8A	39b/	NA	6			
8F	103b/	NA	18	417b/	NA	62
Sedan	15b/	NA	1			
Mooney - M -18L	39	9	10	70	16c/	18
Piper						
Cub Special	194	20	29			
Supercruiser	1	-	-			
Family Cruiser	30	6	4	2,250	343	472
Vagabond	49	5	15			
Clipper	515	110	145			
Stinson	107	4	7			
Ryan - Navion	159	13	16	1,331	118	133
Taylorcraft						
BC12D -85	18	3	5	44	8	10
BC12D -65	4	-	-			
Texas Engineering - Swift	37	3	9	126	12	30
TOTAL	2,376	295	424	9,955	1,154	1,628

NA Not available a/Military type aircraft sold to other than U.S. Military customers
b/ Six months only c/ Estimate

CHART reports shipment of 295 personal planes by 11 companies during month of July

Plane Care for Flight

(Continued from page 45)

pulled out, the inside of the cylinders sprayed with a rust preventative, and the plugs replaced. The rust preventative burns out when the engine is run up again.

When a plane is staked out, the tie-down lines should be allowed a little slack. They should neither be tight, nor real loose. The slack is necessary to allow for shrinkage of the lines during a rain. Tie-downs should especially be checked during winter and the accompanying high-wind periods.

Other winterizing devices include a changeover to lighter oil and grease if the plane hasn't been greased with the high-and-low temperature grease. Also get an engine cover, so that melting snow won't accumulate in the engine.

Providing a hangar for your airplane is the nicest thing you can do for it, of course. But hangars are admittedly expensive and, with proper care, outside tie-downs are satisfactory. Only real danger is hail. And for hail there is no preventative but a hangar. In many parts of the country, however, the threat of hail is remote.

Major factors in maintenance are still the periodic checks, and we do not mean to underemphasize these in stressing progressive maintenance. But the pre-flight checks can help in continuously keeping ahead of any breakdown. Tex and I figure a pre-flight like this:

1. Check the tires to be sure there are no cuts and inflation is correct. If it's too low, the side walls may be cut by the rims on landing, and eventually break. If it's too high, the tires will be too stiff and there'll be no give to the rubber.

2. Walk around the entire plane and check the wings, fuselage and empennage for such things as loose fittings or bolts, unsecured radio antennae which might whip and cut the fabric, holes in the fabric which will enlarge themselves in flight. Check the static tube of the airspeed indicator to be sure the entry holes are clean, otherwise you will not get accurate airspeed readings. Jiggle the ailerons, rudders and elevators, and check the hinges and the safetying of any bolts. Any noticeable play in the control surfaces should be a sign to calling an A & E immediately.

3. Check under the hood. Main things here are the spark plug terminals. Check to be sure they are tight so they will not vibrate loose in flight. If the terminals are the clip type, you will be able to turn them, but you should not be able to move one side of the clip away from the plug terminal. In other words, they can be turned on the terminal but there should be no play while you turn them. The cables should then be checked for any frayed portions which might ground out the system.

While you're still under the hood, check for oil leaks. Look on the cowling section underneath the accessories section of the engine. There will normally be some oil seepage which is not altogether bad as it indicates good distribution of oil throughout the system. But if it looks excessive, call the mechanic. Here, of course, it's imperative to have clean metal or you'll never be able to tell new oil from old. A clean engine, without a covering of grime which holds in the heat, is also a cooler engine.

Check also under the hood for any gas leaks. If the plane does not have gravity feed, work up pressure by hand and check for any leaks. Look especially near the metal fire wall where chafing of fuel lines on the metal may have caused leaks.

Check the exhaust stacks for looseness. If a stack comes off in flight, it usually means that the exhaust flame is directed at or near the fuel-line system—and that isn't exactly a welcome thing.

4. While you're around the engine, look over the prop, work it back and forth for play. If it's loose, the retainer nut may not be tight, or the prop-shaft cone could be loose from wear. You could lose a prop if this is not corrected.

5. Check the gas and oil. That means unscrewing the oil rod, and taking a personal look into the gas tanks. I remember on our round-the-world trip in the A-26, Tex wouldn't let anybody else put on a gas cap. Even the best of gauges can go out of whack.

6. Drain the gas pumps to check to see that the gas is free from water or any other foreign substance. Stick your hand under the flowing gas. Water will run off your hand quickly because of the natural oils in your skin, but the gas will stick. Or collect a sample bottle. The water will show up in bubbles in the bottom on which the gas will float. Do this after gassing—a minute or so is enough time for whatever water you may have taken on to sink to the sump.

7. The run up. The procedures will be somewhat different according to the plane, but this much should be standard. Check the magnetoes. Anything over a 50-rpm drop deserves to be looked into. Any drop over 100—turn the plane over to a mechanic. Pull on the carburetor heat, and check to see that you get a drop off in rpm's indicating that the device is functioning.

Then run the engine up to full power and check to see if you have full take off rpm's. A certain friend of mine didn't do this one time when he was about to take off from Hicksville Airpark, Long Island. It happened he couldn't get full take-off rpm's. Fortunately he just made it over the trees, circled back for a landing, with more trees around him, came in, and found that the throttle had become stuck at a certain point on the cowling, preventing him from

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Arctic Research—USN

(Continued from page 15)

important problem now is, how will it react operationally? Therefore our interest centers on the development of suitable equipment for the aircraft. One of the first questions any pilot will ask when told he will fly in adverse weather is "What kind of de-icing equipment is provided: inflatable de-icing boots, or hot wings?" De-icing boots are made of rubber or neoprene and are best adapted for use on relatively slow-speed aircraft, on which they may be readily attached to the wing skin without danger of distortion. De-icing boots are capable of removing ice accumulations after they form on the leading edge of the wings. Thermal anti-icing, on the other hand, prevents accumulation by melting ice and evaporating moisture forming on the leading edge. If the amount of heat supplied is insufficient the moisture will re-freeze aft of the heated portion, thereby increasing aerodynamic drag. Thermal anti-icing is preferred to boot de-icing because of the short life of the boots and the difficulty of securing these to the wings of high-speed airplanes.

Yet, in spite of its limitations and shortcomings, rubber is used throughout the aircraft. This presents many engineering problems that have to be solved for, unless rubber is specifically compounded to withstand cold temperatures, it loses its flexibility and other properties. Flexible hose used in fuel, oil and hydraulic lines becomes hard and brittle and break from vibration.

Strangely enough, flat tires that are only flat on one side often result when aircraft are allowed to stand exposed to extremely cold temperatures. The tire and the inner tube become stiff from over exposure, distorting that part which has been in contact with the ground. Even if failure does not result, the flat spots may cause serious damage through vibration. By experimentation, these problems are being gradually overcome.

Because many greases and oils tend to thicken and become more viscous when subjected to extremely cold temperatures, the Bureau of Aeronautics has developed low-temperature lubricants for specific purposes. These are used to lubricate landing gear struts, control sheaves and instruments.

A major item not readily apparent to the average cold-weather pilot, is the problem of proper preservation and packaging of spare parts and equipment. Techniques employed throughout the war utilized agents and compounds primarily designated for tropical climates.

By experience we learned that many of these methods and materials are unsuitable for normal use in the Arctic because of embrittlement, great difficulty in removal and several other considerations.

In order to provide maximum flexibility in support of operations, it is necessary that new methods and materials be developed which will work with complete satisfaction in all climates. Research and development in the solution of these problems is being co-ordinated with the military services and interested segments of industry.

In early post-war trips to the Arctic and Antarctic, we were confronted with the problem of ice, snow and frost removal from aircraft surfaces when planes were on the ground or flight deck.

Planes left standing in the open frequently became unfit for flight when the temperatures ranged between 20° and 32° F due to accumulations of frost and ice. This is dangerous not only from the standpoint of increased weight but also because of the drag characteristics introduced on the airfoil sections. Accordingly, all frost, ice, etc. had to be removed either by hand or by bringing the plane into a heated hangar. The logical answer to overcoming this problem lay in an anti-icing spray which would remove the accumulations in a matter of minutes. A non-toxic, non-corrosive and non-inflammable compound was developed which removes ice by lowering the freezing point and provides additional protection for treated surfaces for approximately two hours. If the temperature drops below 14° F, the solution is not effective. However, with such low temperatures, ice and frost accumulations are sufficiently brittle that they may be removed easily by sweeping or dragging a rope across the exposed surfaces.

(Continued on page 48)

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Arctic Research

(Continued from page 47)

These problems constitute some of the external factors in the battle of the aircraft against the elements. The solutions aid in adapting the plane to its environment, but without any regard for the fellow at the controls.

Naturally when considering the pilot we cannot change the human element to suit the conditions, but we can improve the devices which aid the pilot in overcoming the adverse conditions encountered in arctic regions. Under this heading comes the matter of flight instruments. In flight, ice formation on pitot tubes, radio masts and other instruments with external members has been readily overcome by conventional electrical anti-icing systems including thermal blankets. Internal instruments are protected by improved cabin heating systems which employ exhaust gas heat exchangers, or combustion-type heaters, operating on the same fuel used for the main engines.

In airplanes having pressurized cockpits, hot air from the main engine compressor is used to heat as well as pressurize the cockpit. Light-weight thermal insulating materials are used to reduce the amount of heat loss and to control the noise level within the occupied spaces.

Adequate protection for the pilot is of paramount importance. In polar areas there is no room for mistakes and a cold pilot cannot be expected to cope with the exigencies of any situation which might arise. Accordingly, the Bureau of Aeronautics is constantly developing, testing and procuring improved aviators flight clothing and related equipment.

In the event that aviation personnel are forced down in the arctic, numerous items have been developed for their protection. For overwater ditching, the Mark 1 and 2 exposure suits greatly increase chances of survival and rescue. By keeping the body and clothing dry, these suits build up a thermal barrier which reduces the chance of death from exposure or shock from wind chill and radiation loss.

A survival kit for overland emergencies in the arctic and sub-arctic has been developed. It contains adequate gear for survival until a rescue can be effected or additional equipment dropped.

The interest of the National Military Establishment in extreme cold weather operation of aircraft has increased rapidly during the post-war period. This has been largely brought about by the increasing range of our aircraft which can now travel non-stop halfway around the world. It means that civilian air transport of the near future will travel over the polar regions on non-stop flights between major cities of the world. It also has a grave significance in the field of military aviation. Consequently we are making every effort to gain complete knowledge of these areas and the inherent flight conditions. In this field, Naval Aviation occupies a prominent position, constantly supplying a free interchange of information with the groups concerned. No one knows where the next battle area will be, or if there will be one, but if it's in the realm of the arctic, the U. S. is ready.

Flying Photog

(Continued from page 44)

where Hal once ran a photo shop as a youngster, and they still got back to Salt Lake ahead of the land-lubber photographers on the Dragerton Job.

It turned out that pictures of that wild country were scarce and that tourists and magazine editors wanted them by the hundreds.

The joy ride finally paid off heavier than the assignment that led up to it. Since then Hal's plane has become well known in what pilots have called, "the damnedest country in the world for a forced landing," and he has learned that it isn't so tough after all if you are careful and use your head, and don't have forced landings.

The BT's belligerent bellow has intruded on a western movie spectacle being filmed at Monument Valley and its shadow has fallen across the wonderous arch of the Rainbow Bridge which Zane Grey immortalized in "Riders of the Purple Sage" and "The Rainbow Trail"; and the "old bucket of bolts" has rumbled along the entire length of the Colorado's monstrous excavation project from Green River, Utah, and the Yampa Canyon clear down below Lake Mead and Boulder Dam.

Hal has eaten the frugal fare of friendly Navajo indians while his plane sat outside a native hogan that differs only in non-essentials from the Indian houses as they were when Columbus sailed from Spain; and he has shot literally thousands of negatives of the greatest unexplored area in the nation.

But the airplane has developed other uses, too. He does aerial obliques with it for mining engineers who want them to supplement the aerial maps made with mosaics by professional mapping companies, and he has learned that his full color shots with the Speed Graphic are popular with mining men who can use them for soil analysis and lode tracing as well as providing clues to faults in ore veins and their probable termination.

When Sir John Cobb was shooting his many-wheeled juggernaut at the 400-mph speed mark on the Wendover Salt Flats, the runs were invariably made early in the morning . . . and cancelled time after time at the last minute. Hal and Bud used the plane to cover it for a national magazine by leaving Salt Lake at dawn and landing 45 minutes later at the race course. If Sir John cancelled out, they high-tailed it back to Salt Lake—and were there by 9 o'clock, ready to resume the normal day's work.

Hal often flies alone, though, and has learned that for high-level work the dependable old BT will take good care of itself and him. He flies from the front cockpit and when ready to shoot rolls the stick over between his knees to hold it in position while both hands are free to handle the camera. On low-level obliques, he gets a pilot to fly him from the rear seat.

He owns a total of 19 cameras, ranging from a 35-mm Leica up to an 11 by 14 view camera, but confines his aerials to three machines. They are a 10-inch and a 15-inch 5 by 7 Fairchild F-8 and a 4 by 5 Speed Graphic for color photography, using an f.4.7 lens. He always throttles back to 100 Indicated or less and then uses the highest shutter speed practical. In the Fairchilds this means 1/400th of a second at f.11 with a minus blue filter and XX Aero Pan film. He develops everything in D-76, 20 to 25 minutes at 68 degrees, likes a gamma just under .9 and tries to print on #2 contrast paper.

In color he uses either Ansco or Ektachrome and develops all the film himself, in spite of it being a slow and therefore expensive process. When sent out for commercial processing, his films too often came back looking like they had been developed in crankcase draining. When you consider that Hal's pictures have appeared in quantity in quality magazines (*Holiday* once used 43 in a single issue) you can understand why he cannot take chances on bad workmanship. It would be costly in many ways.

The color is exposed 1/200th of a second at f.4.7 in bright sunlight only. If the weather is murky, he doesn't waste film.

Now 39 years old, slender, dark-haired and alert, he looks in his late 20's and has been flying for 6 years. He has logged less than 400 hours but most of it has been pay dirt.

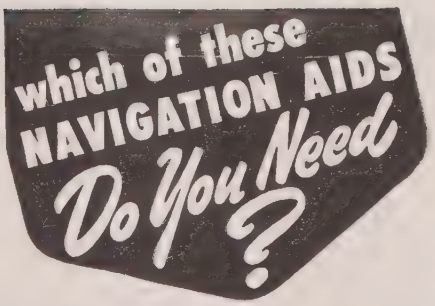
He "got in" photography as an amateur in high school in 1929 and had his own shop in 1932 at Ruby's Inn near Bryce Canyon. In 1940 and 1941 he worked for D. F. Davis, then the leading intermountain commercial photographer, and the man bought out in 1943 after being discharged from the Army where he rose to the rank of private. He previously worked several months for Douglas Aircraft as a Class A photographer under Harry Cottrell, shooting pictures of plane assemblies and even the more enticing assemblies of visiting film stars.

His first four months in business late in 1943 netted him less than $600, but it only took four years to boost his gross income with six employees up to $50,000 by the use of endless imagination and a daring concept of original work that has made him generally recognized as the number one commercial photographer in the intermountain west and one of the nation's top ranking flying cameramen.

It is true that flying hasn't added any great wealth to his bankroll, but the airplane has become an integral part of his shooting equipment. The stockpile of negatives sells more prints all the time and as his fame has widened he has gotten many $100 orders for huge murals to adorn new and swanky hotels, bars, cafes and theaters all across the nation.

The plane has also given him a practical means of getting back to the Colorado River country several times a year for relaxation, visits with old friends, and a new look at the ever-changing vista of America's greatest scenic spectacle, which is always creating itself anew in varying light with myriad colors; and which never ceases to thrill him as he points the camera lens downward in front of the wing.

Hal Rumel has, indeed, taken advantage of a combination that in his line of work is practically unbeatable—the airplane and the camera.



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He Who Flies Backwards

(Continued from page 33)

a couple of bright-eyed boys if an airplane would ever be capable of encircling the globe without refueling.

"Yes," replied Mikhailovich. (Obviously, the Russians had weighed the possibilities.) "It would fly high, perhaps 12,000 to 15,000 feet." The boys stood open-mouthed as he continued. "Wiley Post's old route would do it, Moscow-Khabarovsk-Alaska-New York-Paris-Moscow. It would take from 80 to 90 hours."

Further interrogation revealed the amazing fact that the Russians, at that time, felt sure that within a short while they would be able to negotiate a Moscow to Southern California round trip with greater ease than the one-way journey they had just completed.

In spite of the spectacular aspects of the Russian flight, however, true maximum-range flight was still some distance in the future even as late as the early days of the last war.

Symbolical of our dearth of knowledge concerning the subject is a statement made to me recently by Jimmy Doolittle, leader of the first United States bombing raid over Tokyo. I asked him what methods were employed in determining the maximum range of the B-25's used in the Carrier - To - Tokyo operation.

"While still in the States planning the Tokyo mission," said Doolittle, "we made a series of flights under varying load conditions, checking rpm, manifold pressure and air speed against fuel consumption. "I could almost see Doolittle sweating out the information which he knew would in a short time mean life or death to the boys in his command.

"Among other things," he continued, "it was determined that with this particular airplane, engine, load combination, etc., maximum range could be achieved at minimum altitude. All in all, our system of cruise control was rather primitive."

Primitive though it may have been, this was our best maximum-range flight procedure in 1942. But from the half successful, half tragic results of Doolittle's Tokyo flight came two salient facts: long-range flight must no longer be left to hit-and-miss procedures; the United States should prepare to squeeze the last mile of range from our mighty bombers.

Coincident with this reasoning came the development of the B-29, the great *Superfortress,* at the time the most hush-hush bomber of them all. General Arnold, who had been a power behind the development of the mighty Boeing, was determined that his baby was going to "fly furthest with the mostest." Furthermore, he was determined that it was practical to plan a flight of known distance, then, with a specified amount of fuel aboard, to fly that specific mission in spite of winds, weather and Walhalla.

Accordingly, Arnold approached a Captain, an aeronautical engineer in civilian life, who had been working for some time on the development of cruise-control charts for the B-29.

"Captain," said the General, "I want you to prepare for me a simulated flight plan. Figure out just how many pounds of fuel it would require to fly a B-29 on this mission."

Without revealing his true intent, the General dictated the total number of miles to be flown, the altitude, the simulated bomb load, all the various factors of flight.

Then, retiring to his quarters, Arnold left the perspiring Captain with his problem.

Working late into the night, the young officer completed his calculations. Considering every possible emergency, he determined that a B-29 should be able to fly to the destination, as indicated by General Arnold, return to base and land with just 200 pounds of fuel remaining in the tanks.

Early the next morning, Arnold summoned the Captain and asked to see the results of the Junior officer's figures. "Fine," said the General after a moment. "Now, I want you to brief a crew and fly me on this mission."

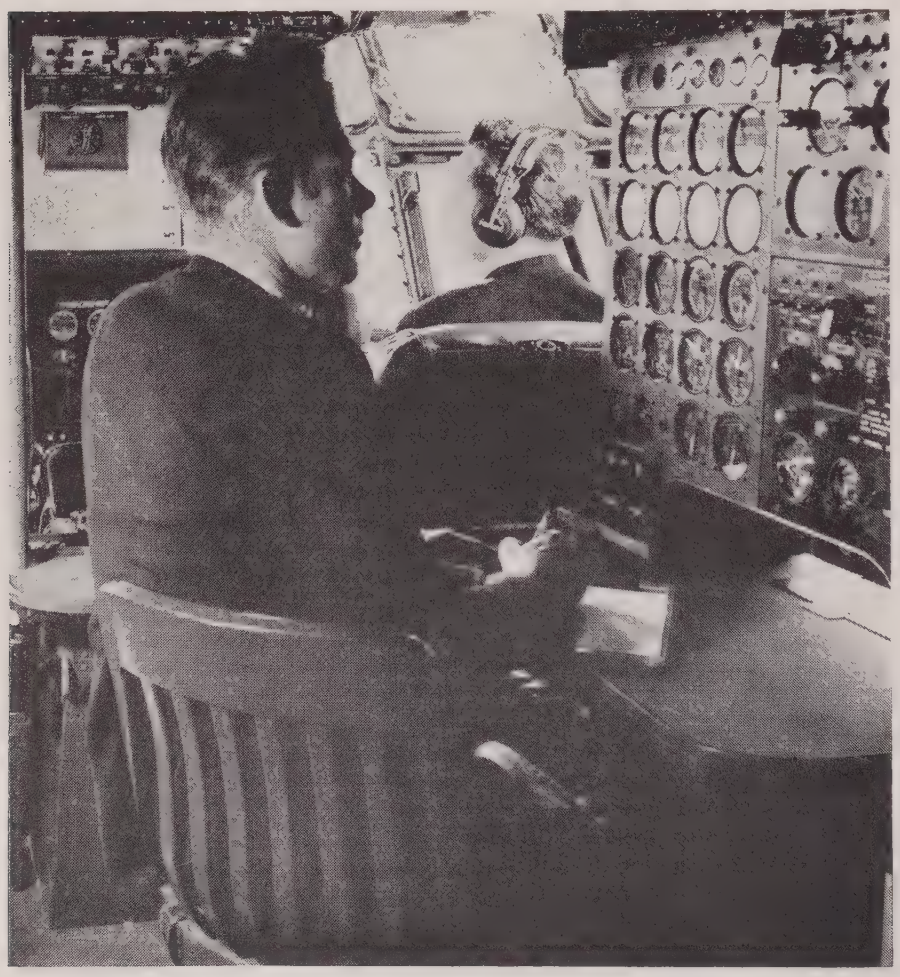
With fear and trembling, the engineer summoned a crack pilot and crew. Throughout the trip, with Arnold going along as observer, the Captain called off fuel mixtures, power and rpm setting, altitude and air speed.

Finally the airplane returned to base. With the General still in strict attendance, the engineer ordered the tanks drained. Just 10 pounds less than the predicted reserve flowed from the cavernous containers. Needless to say, the young Captain breathed a great sigh of relief. But more important, General Arnold was convinced that a redistribution of the duties of the crews of long-range bombardment aircraft was absolutely necessary. The first results of B-29 raids served to support this decision.

For example, *Superfort's* based in India and China were failing to live up to the expectations of those who had planned and conceived the airplane. The B-29 had been designed to carry a greater payload further than had ever been done before. But it soon became obvious that the full potential of the 120,000 pound monster was not being utilized. On the way home from long-distance flights, B-29's were running out of gas and crash landing all over the Orient. This, to say the least, was discouraging to all concerned.

No less provoking was the case of the Marianna-based *Superfort.* With one engine badly overheating, this airplane was limping home one day after a strike at a Nipponese city. The cowl flaps on the hot engine were opened in an attempt to lower the temperature. Unfortunately, the crew of the ship failed to realize that the terrific drag created by the open cowl flaps was eating up precious power and gasoline. At least, up to that time, no one had thought to allow for the extra gasoline that might be needed in just such an emergency. Consequently, just a few short miles from home, the big Boeing bomber

(Continued on page 59)



BOEING STRATOCRUISER cockpit includes station for flight engineer just aft of pilot and co-pilot's position. Five-man crew of *Stratocruiser* is comfortably quartered here

Pilot's Report . . . The Cessna "140"

(Continued from page 22)

in airworthy condition sittin' around in the back of the hangar, send it to the Wichita factory and they'll put it in your 140 at a saving of $595 on the 85 and $745 on the 90-hp ships.

As in all high-winged monoplanes, the gas caps are hard for a pilot to check. Height of this airplane is over six feet and if the ship is fitted with wheel pants, as was N9412A, you can't reach the gas caps for checking without a ladder.

Beside the wheel pants, N9412A had the following extra equipment: a McCauley prop, landing lights, dual brakes and a two-way radio. Most Cessna sales are made with the McCauley metal propeller at an extra $90 because of slightly improved performance and lower long-time maintenance costs. The left wing panel is wired for landing lights on all ships but the actual light installation costs an extra $25. Right seat brakes cost an extra $20 and are almost a "must" for flight instruction.

With its single heavy strut, the new 140 is much easier to enter than the older model. The doors are wide and the position of the seat is adjustable on the ground. Basically, the cockpit interior has been changed only in styling. Airline-type ventilators are individually operated from scoops in the leading edge of the wing. These scoops have rain traps installed so that the 140 won't "ship water" in the hardest rain storms. The cabin is so efficiently soundproofed that a large part of the noise comes from these vents when they are opened.

When you climb aboard this new 140, you immediately have the impression of a finished airplane. Both cabin and ignition lock with the same key. The stall warning indicator, installed as standard equipment, is located at the far left of the panel just above the radio. Below the flight and engine instruments, six push-pull buttons control the mixture, carburetor heat, parking brake, cabin heat and starter. One button is blank and available for accessories. A very efficient mixture-control lock makes it impossible for even the most excitable pilot to starve the engine accidentally while reaching for the carburetor heat control. There is no idle cut-off on the mixture control and the engine is cut with the switches.

We asked Don Flower, Sales Manager for Cessna, what would happen if a pilot accidentally pulled the starter control while reaching for the parking brake at the end of a flight. They are separated only by the cabin heat control. He replied that "this is occasionally done and, while it is not good practice to pull the starter with the engine running, it is unlikely to cause damage."

Doctor Netzley climbed in and we fired up the little Cessna. Visibility in taxiing is excellent and it is easy to see the runway directly ahead with the Cessna's droop-snoot flat cowling. While the taxi strip is more than a little rough at East Los Angeles, the spring-steel landing gear smoothed the ride perfectly. Over 10,000 sets of these maintenance-free gears, designed by racing pilot Steve Whittman, are now flying on Cessna aircraft.

Incidentally, the 140 is approved on floats and is reported to be an excellent seaplane.

The Doctor clocked our take-off, 13 seconds with a normal roll into a 6- or 8-mph wind. The factory recommends that all Cessnas be taken off in the same manner: just as soon as the tail starts up, begin to ease back on the wheel just enough to keep the plane nose high. When it has sufficient speed, the ship will fly of its own accord.

During climbs, full throttle is recommended since the new 90-hp engine has an enrichening jet in the carburetor to keep head temperatures down. This same set-up is now used on the larger six-cylinder engines.

Even in steep climbs, visibility is much better than average for a high-winged monoplane. The two top windows aid materially in seeing during turns in a congested area like the air over Los Angeles.

If anything, the finger-tip control of the older Cessnas has been improved. The slightest pressure will make this light-fingered airplane turn. At first the Doctor was over-controlling the little 140, but he soon settled down, let go of his heavy-handed grip on the wheel and cradled the controls as though

(Continued on page 56)

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Flight in a Basket

(Continued from page 19)

under his arms, automobile road maps and a blindman's little tin cup into his hands, cover his feet up to the knees with sand bags and release him to the mercy of the four winds with a cheerful, sadistic, "You're on your own!"

But seriously, free-ballooning is a lot of fun, as I found out that November day when I had my first try at it. The day dawned fair and crisp with a surface wind of about 12 knots from east-southeast. This was the east wind Lakehurst instructing officers had been waiting for in order to check out Lighter-than-air Flight Class XIII in overnight free-ballooning. The class consisted of six officer-students of whom I was one. We had all been looking forward to free-ballooning because we had heard that it was a lot of sport, but we also realized that it was an important phase of our training. When an airship pilot's motors fail, his airship immediately becomes a "free-balloon" for all practical purposes and he must be trained to fly it accordingly.

Ground school was cancelled for the day and we students headed for the hangar to witness our first balloon inflation. On the way we dropped by Operations for a look at the flight list. There were to be three balloons. Ensigns Keen, Goodloe and myself were assigned to Balloon #1. Lt. Commander Rounds was to be our instructor. The three of us were highly pleased at this news because it would be the first time we had had the privilege of flying with this popular officer who was famous in lighter-than-air circles for his brilliant blimp sea-mooring and sea-rescue work. We met Rounds at the hangar where one balloon was already inflated ready for flight and the others were laid out on two canvas ground cloths. He greeted us with a quiet, friendly smile.

"Good-day, gentlemen," he said. "You're just in time to watch the last two inflations. If you wish I'll give you a quick 'Cook's Tour' of what's going on. After that you can wander around on your own and look over everything that interests you and I'll assign each of you a detail or two to take care of before we take off about five o'clock this afternoon."

"I'm Boyd, sir. This is Ensign Keen and this is Ensign Goodloe, and I, for one, really need that 'Cook's Tour'," I grinned uneasily. "The activity here looks like a three ring circus to me but I certainly don't recognize any of the acts!"

"O.K., fellows," Rounds laughed. "This inflated balloon weighted down with sand bags here is ours. All three balloons will take part in a race starting at five tonight. The balloon team that is farthest away from Lakehurst by noon tomorrow wins. Come on over to our balloon basket and I'll quickly explain her salient features so that if I get left hanging by the pants from a tree limb somewhere, you fellows will be able to get yourselves down all right."

I glanced at Keen and Goodloe. They glanced back at me. I guess all three of our faces reflected the gloom of a funeral parlor.

"Now don't get excited." Rounds evidently read our thoughts. "I'm not planning to take a powder on you in the midst of our little ride, but you'll be amazed at some of the things that can happen on one of these shindigs. People have been left before hanging on to tree tops while the balloon basket moved on. Furthermore, no two flights are ever the same, so climb aboard tonight prepared for anything except boredom.

"Now that big bag above us contains 35,000 cubic feet of helium," he went on, pointing up at the silver sphere about 15 feet over the basket. "Since air weighs about 80 pounds per thousand cubic feet and helium only 11 pounds per thousand under standard conditions, we have a lighter-than-air force in this bag of 2400-odd pounds waiting to carry us up into the wide blue yonder."

Goodloe and I looked rather worried I guess and muttered something under our breaths.

"I heard you," Rounds laughed. "What do you mean—the Navy must be getting pretty hard up to have to 'shanghai' ensigns like you for 'human cannon-ball' experiments?"

"Well, you say we've got a force of about a ton and a quarter here in this bag waiting to carry us straight up and the weight of the four of us will barely counter-balance a third of that force. That leaves an awful lot of 'umph' ready to bore a hole in the sky with us." I began sheepishly.

"Hold everything, Boyd. See those sand bags?"

"Yes, sir."

"Well they aren't just used to hold the balloon down while it's in the hangar here," Rounds explained. "A lot of those sand bags are going with us for ballast." And he went on to relieve our horrible ignorance on a lot of the 'ins' and 'outs' of free-ballooning.

"And now you're on your own, fe lows," he concluded. "If there's anythir more you want to know we'll straighte it out on the flight tonight. Don't forge Keen, you're to bring the last minu upper air soundings and the instrume box, Goodloe the pigeons from the pige loft and Boyd the road maps and balloc log. See you at four forty-five this afte noon. Be sure to dress warm. It can g awfully cold on a November night in free-balloon."

We spent the rest of the day mullin over the things he'd told us, watching th remaining inflations, checking the weath and generally getting ready for the night adventure.

By the time we reached the field four forty-five, we had pretty well co cluded that either our instructor coul put Paul Bunyan's creators to shame we could expect a pretty interesting figh The ground crew was walking all thre balloons out to a suitable launching poi clear of all possible obstructions. L Comdr. Rounds arrived carrying a sma battery radio set.

"A touch of luxury," he grinned. "Let climb aboard for the weigh-off."

When we finally unscrambled afte tripping all over the rows of sand bag in the bottom, we each had a corner the big wicker basket. I felt for all th world like one of the men in the tub Mother Goose fame. As we waited, me in the ground crew began to unload on sand bag after the other from the sides the basket. Slowly the basket began t stir beneath our feet. Finally, it appeare to be almost in equilibrium.

"Stand by to weigh off!" the ground handling officer commanded, and the me about the balloon stood ready to take thei hands off the basket.

"Hands off!"

The balloon basket floated in the air fo a minute then gently settled back to earth

"One more sand bag off!" Round ordered. Another weight-off showed tha the balloon would slowly go up.

"Ready?" the ground officer asked Rounds nodded.

"Let go!"

"What a nice easy way to take off," remarked to Keen. He nodded.

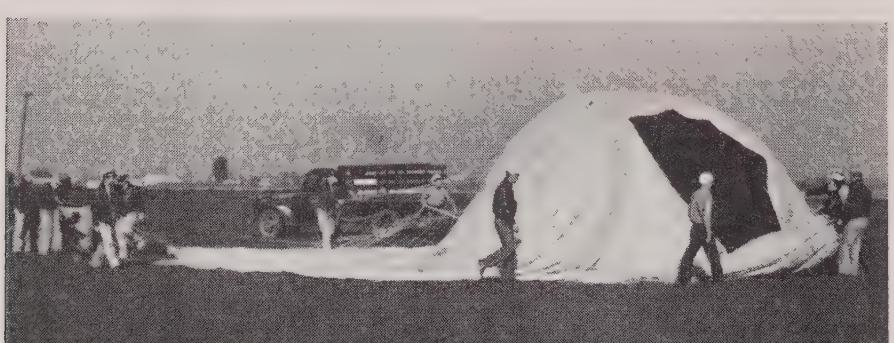
The balloon basket rose smoothly t about 10 feet as we gradually picked u ground speed equal to the wind—abou 12 knots. Suddenly the balloon hesitated lost altitude and we found ourselves being dragged over the ground with the baske completely on its side and all of us hang ing on to the basket ropes for dear life.

"Boy! What an optimist I was!" mourned as I tried to keep Walt Keen's husky frame off my aching ribs and the basket continued to bump over the ground like a pneumatic street hammer gone wild

"Quick, fellows, dump sand!" Rounds shouted. "We're headed right for the brick side of the Administration Building and we've got to get off the ground and grab some altitude fast!"

Those of us who weren't pinned down under the others suddenly became badgers digging holes with that sand.

After an agonizing moment that seemed like Eternity, the balloon began to rise with tantalizing slowness. As the basket left the ground it picked up a pendulum



END OF FLIGHT, crewmen begin folding balloon, packing it for shipment back to Navy airfield

motion that made our stomachs feel as if they were in a loose elevator without a cable. All eyes were buggily riveted to the on-rushing brick wall. I had a feeling I was about to know how a fly feels when it gets swatted.

But luck was with us. The pendulum moved in just the right direction at the last moment to clear the wall by about six inches.

"Whew!' exclaimed Keen. "Was that a normal take-off?"

"No, but any time you climb into a free-balloon you can expect lots of variety," Rounds assured us. "Because of our little take-off incident we dumped much more sand over the side than would normally have been necessary. If you will read the variometer, the instrument box hanging from the load ring here, you will see that we are going up like the so-called bat out of hell. Give me that upper air sounding data, Keen, please."

"Yes, sir."

"Shall I valve some helium?" said Goodloe, who had been assigned the job of standing by the valve cord which runs up through the center of the bag from the basket and operates a simple butterfly type valve in the very top of the balloon.

"No, this is a balloon race," Rounds reminded us, "and the less we use our helium valve and sand ballast the farther we will be able to travel before we have to come down. We'll just let her go as high as she wants to go for the time being. According to the upper air soundings here we have good winds and direction at practically all altitudes. Later on tonight we'll drop down and ride the inversion to save ballast and helium."

"Boy, we're sure getting up there!" Keen remarked. "The altimeter reads 9,000 feet and we're still going up, but we seem to be slowing down a little."

"Yes, we ought to level off at about 10,000 feet or so," Rounds said.

I looked over the side of the basket at the distant earth below. It's a funny feeling knowing you are two miles up with no parachutes and nothing but the bottom of a wicker balloon basket between you and cold hard ground. It is also a weird spooky feeling moving over the earth without the slightest motor or wind noise. A free-balloon ride is eerily quiet because drifting along at the speed of the wind eliminates all sensation of air movement in the balloon basket. The only noises heard on a balloon ride are those transmitted from the earth below.

"Listen to those dogs barking way over in Lakewood," I commented. "They must be at least 15 miles away. Are you always able to hear this well in a balloon?"

"Remarkable, isn't it?" Rounds agreed. "The self-noises of any other type of aircraft prevent experiencing these amazing acoustical phenomena."

Our balloon had finally leveled off at about 10,500 feet and we were drifting fast to the northwestward. It was quickly growing dark and far below us we could see the other balloons in the air. Gradually we were losing contact with them since our wind at 10,000 feet differed by almost 30° in direction from the lower winds affecting them. Rounds leaned down and turned on the balloon's battery-powered navigational lights. One by one lights began to pop out like pinpoints on the earth far below. Soon we could recognize Lakewood, Camden, Philadelphia and Reading by the luminous sky glow in the directions of these cities.

BALLOON is collapsed by pulling the rip cord. This opens large gap in side of balloon and permits gas to escape, dropping basket and crew gently to earth at completion of free flight

Up to this point we students had been so fascinated by the thrill of our new experience that we hadn't noticed any of the quaint physical discomforts of free-ballooning. But now Goodloe was blowing his fingers.

"I'm darn glad we wore our heavy flight clothing," he said through lips that were faintly blue.

I heartily agreed because I, myself, was beginning to feel as cold as the little man that turns on the light in the refrigerator.

"Well, it's about time to settle down for the night," Rounds said as he turned off the radio. He had obtained the weather reports but nothing else of much interest.

"Let me have a look at that position you've computed, Keen. Boyd, reach up and grab a pigeon out of the box hanging over your head there and we'll send our position report back to the station. After that Goodloe and I will take the first watch while you two try to get a little shut-eye. We've got a long flight ahead of us so grab some sleep if you can."

After launching the pigeon and amusedly watching the little "feathered compass" circle the balloon three times and then make a bee-line for its loft at Lakehurst, Keen and I tried out our 'bed'.

Have you ever tried to sleep in a bed that was about a foot too short for you? Well, if you are a stickler for realism and really want to experience the delights of sleeping in a free-balloon basket, get yourself such a bed, yank out the springs and in their place lay several rows of sand bags. Now lay down on the sand bags, bend yourself in assorted places to fit the scanty bed length, have another fellow lie down beside you and order him to kick you in the shins and shove his elbows into your stomach at frequent intervals. Then have a second fellow stomp all over your feet and ankles every few minutes. Finally, have a third assistant stand on the sand bags with his feet so close on either side of your face that you can't turn your head. Now you are ready to catch some sleep under conditions faithfully duplicating the lullaby atmosphere of a four-man balloon basket.

Needless to say, no one in our balloon was particularly anxious to get off watch

(Continued on page 54)

Flight in a Basket

(Continued from page 53)

and hit the sack. Keen and I finally gave it up as a bad job after a couple of hours and arose to see what was going on. We were skimming along in a nice wind at about 800 feet altitude. The terrain was really getting rugged and Rounds told us we were nearing the Appalachians and that the wind was swinging us more and more to the north toward the Catskill Mountains.

"It's amazing the way the balloon seems to 'see' the mountains ahead and without our using any ballast rises to pass over the ridges and then descends into the valleys again," I puzzled.

"Just an old balloonist trick to conserve ballast," Rounds explained. "We're riding an isothermal layer of warm air immediately above a very stable cold air mass that extends from the ground up to about 800 feet. The balloon tends to automatically stay just on top of this cold layer because any time it drops into the denser cold air it becomes more bouyant sending it back into the warm layer again."

At this point Keen and I took over the watch and the others tried the 'bed'. When the first faint traces of dawn appeared, they had had enough. As darkness slowly disappeared, we quickly forgot the hardships of the night in the welcome fingers of light that gradually reduced the chill and lit up the breathless beauty of the mountains that engulfed us on all sides. I believe that one who lives in the mountains all his life cannot fully appreciate their grandeur until he takes a free-balloon ride through them. It is something about the perspective, the closeness and uncanny angles of view one gets while slowly skimming up and over peaks and down abysses—a thrill that can be obtained in no other way than in the dream-like silence of a balloon basket. It seemed a crime that so much colorful enchantment should be wasted on only four human beings. I found myself secretly wishing that all humanity could be with us to fall under the magic spell of the scenery, or that at the very least the right poets and photographers had been along to do justice to its magnificence. This trip would have been the answer to their wildest dreams.

But man can't exist indefinitely on scenery any more than he can on love.

"I'm getting pretty hungry," Rounds announced, "and I know you fellows are too. Do you see that cabin almost at the crest of the mountain ahead? Let's see if anyone is up and around there. If so, maybe they can twist our arms with some ham and eggs. If not, we may be able to land and at least stretch our legs before breakfast."

We didn't have long to wait to determine whether or not there was life in the cabin.

"Hey! Fly that derned thing t'other way fellers! Ever since you was a speck in the sky my chickens been goin' crazy thinkin' yo're a consarned chicken hawk," boomed a man's voice from near the cabin.

Rounds' mouth dropped open. He was momentarily taken aback by this bizarre request. Then his eyes twinkled as he deliberately confirmed the opinion he knew was already held below—that we were some of 'them crazy aeronautical fellers'.

"Cain't steer the derned contraption, Mister. Mind if we set her down for a spell and stretch our legs? Then we'll move along and leave yo're chickens in peace.

"Go right ahead effen y'kin," the voice, this time a bit puzzled, answered.

We balanced out our rough take-off by valving the balloon down to a perfect 'eggshell' landing on a small open patch of ground. We all waited in the basket until the big amiable mountaineer handed us enough rocks to hold the balloon down. Then we climbed out, shook hands and lashed the basket to some young saplings close by. It really felt good to walk on the ground again after a night in that basket. Goodloe stood guard at the balloon while the rest of us entered this mountaineer bachelor's retreat to get a cold drink of water. He was a good-hearted fellow but a glance at his housekeeping quickly convinced us that there was nothing quite so good as breakfasting on coffee and sandwiches in a balloon basket. So with a final stretching of muscles we thanked our host for his courtesy, released another pigeon-mail position report, climbed into the basket, released our lines, unloaded the stones and were off again over the trees. This time the take-off was uneventful except that the basket skimmed through several tree tops and we had a lively time ducking branches until we got clear.

After breakfast in the air, we felt refreshed and at peace with the world.

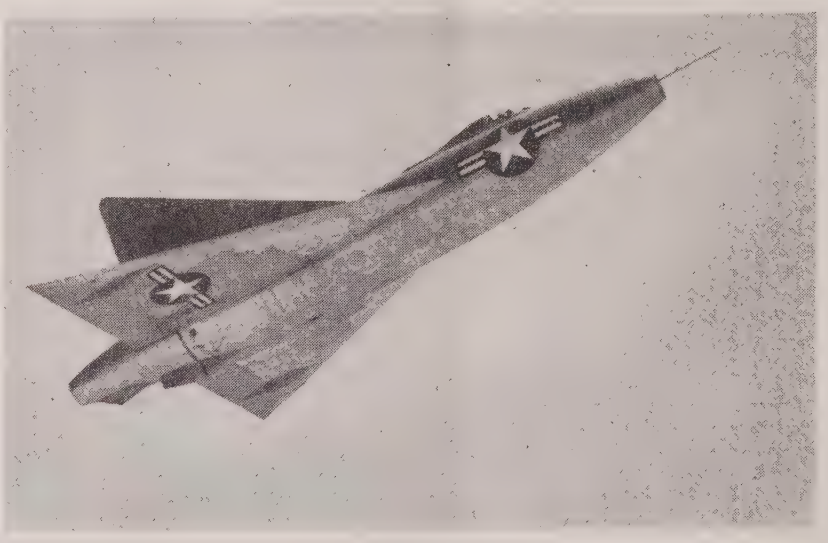
"Now we'll have a little lesson in the use of the drag rope," Rounds said, whereupon he released one end of a 200-foot coil of manila line carried on the side of the basket until it trailed through the trees behind us like a fishing line from a motor boat. He had me dump about four little tin cupsful of sand from a sand trough on the basket for a final delicate ballast adjustment.

"Boy, this is really the life," laughed Goodloe as we gaily skimmed up mountain and down valley sometimes actually touching the trees, but most of the time remaining a few feet above them, the drag rope trailing sinuously behind us. It was amazing what extra control this simple device gave us. If we started to drop too low, more weight of the drag rope was carried on the ground and up we'd go. If we started to go too high, more weight of the rope would be lifted off the ground and down a bit we'd come. Drag-rope flying was really fun. Quite frequently we'd see deer right below us tilting their heads in puzzled fashion as they tried to scent the reason for the strange noise made by the drag rope slithering over the ground.

Rounds pulled the valve cord and released a little helium.

"Look out, we're going to crash right down into the trees!" I yelled.

"No, we're doing this on purpose," Rounds laughed. "Just watch yourselves so the branches don't bat you in the head unexpectedly."



Supersonic Shape

Consolidated Vultee Aircraft Corporation recently announced its delta wing research interceptor, the XF-92A. This strange looking "Flying Triangle" was designed for high stability and low drag at high subsonic speeds. Formerly known as the Convair Model 7002, the XF-92A has begun its research flights at Muroc Air Force Base, California. Jet-powered, the plane has a 60° sweepback to its wing in contrast to the maximum of 35° on current interceptor types. "Elevons" provide elevator and aileron action, with vertical stabilizer and rudder providing directional control and stability. This delta-wing plane is strictly experimental.

Down into the thick green foliage we went until we were completely immersed in the ocean of green and only the very top of the balloon remained in the upper branches.

"Nothing like a good smoke in a free-balloon basket," Rounds explained as he lashed the basket to a tree trunk, "But when you do you want to be damned sure of two things. First, that you are using a balloon filled with helium, not hydrogen, and second, that you've got your basket secured to a tree trunk like this where you can get out quickly in case of fire in the basket."

After our smoke we were up and away again ducking branches on the take-off.

"What a crazy but delightful experience," I kept thinking as I frequently pinched myself to see if I was really awake.

All too swiftly the day wore on. As it neared noon we hollered down to two amazed men on a lonely mountain road. "What's the name of the town up ahead?" Receiving our answer, we quickly checked the road map, verified our location and sent in our noon position via pigeon, express hoping that it would turn out to be the winning one in the balloon race. We hadn't seen the other balloons since darkness closed in the night before so all we could do was hope. We flew on for another three hours just for the sheer fun of it and then ruefully decided we'd better end our flight near a small mountain community where we could conveniently get a truck to carry the balloon gear down to a railway station to be shipped back to Lakehurst.

Our final landing was a normal, rip-cord landing. That means that we pulled the rip cord 10 feet before we hit the ground, thus ripping open the entire top of the bag and quickly releasing the gas to prevent being dragged after landing. We hit the ground with a bump that spilled the basket over on its side and rolled us out on a grassy meadow as if the balloon had said, "That's all, brothers. End of the line."

The balloon envelope billowed gently to earth and we rolled it up, stowed it in the basket, attached freight shipping tags and hired a mountaineer to truck it down to the railroad and ship it back home for us. By the time we released the remaining pigeons and were about to depart for a small village hotel to sleep until train time we had attracted quite a crowd. As we left the scene on the first leg of our two-day trip home I heard a fellow tell his small son, "Keep some of that sand they poured out of the bag for a souvenir, Herman. That's genuine Lakehurst balloon sand."

Incidentally, we landed in the mountains of upper New York and won the race. But I assure you that you don't need to be in a race to enjoy ballooning. Any balloon trip is sport in itself. So next time you see a lowly free balloon in the sky don't look with disdain upon the occupants of the Model "T" of the air age. They are having more fun than you think!

The opinions contained in this article are those of the author and are not to be construed as official or reflecting the views of the Navy Dept.

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Pilot's Report . . . Cessna 140

(Continued from page 51)

they were newborn twins. After that, his flying technique was right on the ball.

We circled down over Long Beach and shot a couple of pictures of the beach. While it is difficult to open the windows beyond the ventilation limits in flight, many press photographers use Cessnas on hurry-up photo assignments because of their good cruising speed coupled with excellent slow-flight characteristics. The newsmen open the windows in flight with a Phillips-head screw-driver, taking off the two screws that hold the window to the handle. The window then floats up in the slipstream against the bottom of the wing, making an amply large opening for a camera. The single-strut construction is a further aid to photography.

The catch-all hatrack atop the baggage compartment is ideal for extra baggage, camera equipment or maps. Don't leave maps on it, however, if you plan to open the windows in flight. There is an adequate map case and glove compartment at the far right of the instrument panel. This window-opening, incidentally, should be done only at reduced flying speed.

It measures 125 miles from Long Beach up the winding coastline to Santa Barbara. Into a weak but consistent headwind of about 10 mph we covered the distance in an hour and five minutes. That's roughly 116 mph ground speed with a power setting of 2250 rpm.

Since the Doctor had missed his lunch, we ate hamburgers in flight and conversed in a completely normal tone of voice. The noise level is only slightly higher than the average airliner. Most of this hop was made with our hands off the controls. Inherent stability is excellent and the ship rolls back on course quickly after hitting any rough air.

From a personal viewpoint, the nicest piece of cockpit planning in the whole airplane is in the trim-tab control. The tab wheel is mounted directly between the two seats, just where a pilot's right hand would normally rest. It is the most natural thing in the world to fly this airplane hands-off and make small adjustments with the trim tab to take care of climb, glide or landing flare-out.

Coming up the coast toward Santa Barbara we had a chance to check the two-way GE radio. The radio fits at the far left of the instrument panel where the pilot can reach it with a minimum of effort. The speaker is mounted under the headliner in the ceiling and reception is remarkably good for such a small set. We were able to pick up the Santa Barbara range station and read his weather broadcast while over the Naval Experimental station at Point Mugu, 50 miles away.

It is always a good idea to try a few practice stalls before attempting to land any strange airplane. Just before we started to let down over Carpenteria, we pulled the nose up to landing attitude and waited. With cruising power the ship climbed rapidly for a while and then started to mush. With power on, the Cessna was still right-side up at 35 mph!

After leveling out, we snapped on full carburetor heat—maybe it wasn't necessary but it's a good habit anyhow. The throttle came closed and we slowed the little two-placer to the 80-mph white mark on the airspeed indicator where flaps are permitted. We pulled up on the flap lever located between the seats and the clean little airplane slowed up more quickly. Full flaps on this ship go down 43° and are more effective than on older models.

The stall warning horn beeped at 45 mph when we were beginning to wonder what was keeping us up there. With the horn blowing, we rocked the ailerons each way and there was still ample control. Finally the ship stalled at 40 mph or a little less with the trim tab all the way back and the control column just off the stops. There was no tendency for the 140 to duck a wing. It just dropped its nose a few degrees and the horn quit blowing, proving we were back flying again.

We eased on 1000 rpm and tried the same thing all over again. When the horn beeped, we racked the ship over in a 40-degree turn and then rolled it sharply into a turn in the other direction—all at 45 mph. Other than the mild tail buffeting, there was never a shudder or any tendency for the ship to "pay off." The more effective aileron and flaps on the new Cessna are in themselves worth a try-out flight.

At Santa Barbara the Doctor made his first landing in a light airplane in nearly eight years. We called the tower over town and were cleared in on runway 15 at the huge Goleta ex-Marine airbase. The Doctor slowed up to about 60 mph on the base leg and turned on his final approach with a little speed to spare. We came across the fence and leveled off just a little high. The ship floated about a hundred feet down the runway as our speed dissipated and we dropped the last two feet, tail-wheel first. The spring-steel gear absorbed all shock and the Doctor brought the ship to a straight-ahead stop with ease.

We taxied into the flight line behind a Southwest Airlines DC-3. Visibility had been excellent throughout the landing and the smooth hydraulic brakes made a straight roll-out simple in spite of a slight crosswind.

In our leisurely flight including stalls, slow flight and shooting pictures, we had logged an hour and 25 minutes. The gas truck pumped in 7.8 gallons of fuel; that's 5½ gallons per hour.

This ship has a 12½-gallon gas tank in each wing with a four-way valve mounted on the floor just to the right of the trim tab. Visual gauges are installed in both wing roots. A fuel set-up of this type is of the greatest advantage on long flights where a pilot plans to run his gas down to a minimum before landing. This fuel system needs no pumps and operates solely by gravity.

After a milk-shake at the airport café, we fired up the 140 and headed northeast toward Bakersfield. The Doctor made the take-off without the slightest difficulty or over controlling.

The 4,000-foot Santa Ynez Range lies less than five miles inland from Santa Barbara, but we cleared out of traffic and headed directly toward the ridges. While a slower air speed would have given a better rate of climb, we kept the needle at 80 mph to assure more than adequate cooling for the new engine. Even at this speed, we picked up 5,000 feet in less than 10 minutes.

Just north of this coastal range lies the San Rafael Mountains, as desolate a stretch of ridges as you'll ever see within 10 minutes flying time of a big town. Forced landing spots here were limited to forestry patrol trails and an occasional fire break. However, the little 90-hp engine kept its powerful purr and we didn't have to investigate these skimpy clearings.

Over the Cuyama Valley we found a

OVER-THE-NOSE VIEW of the runway at Tehachipi Airport proves the excellent visibility provided in the Cessna 140. With flaps down the ship flies nose low, hence . . . good seeing ahead

stretch of unstable air that proved this little ship's rough-air flight characteristics. There is none of the "fluttery" feeling commonly associated with light airplanes in turbulence. This 140 plows through the bumps, shaking them off her metal skin like a dog shakes water after a swim.

From Bakersfield, we turned eastward and followed the railroad across the lower tip of the Sierra Nevada Mountains into Tehachapi. The 4500-foot airport here adjoins the town and has a rodeo corral in one corner. The Doctor wheeled the ship in for a landing in rather gusty air. Just after he crossed the fence and started his flare-out, a gust caught his upwind wing and floated the ship another 20 feet into the air. As a proof of his good flight training many years ago, the Doctor automatically added a little throttle and eased the 140 back toward the oiled runway. We touched down smoothly and taxied up to the hangar.

The last leg of this three-hour flight was from Tehachapi back over the Mojave Desert to Los Angeles. The 3,952-foot-high Tehachapi Airport apparently didn't slow the little Cessna's take-off at all. While the weather was slightly cooler and the wind a little stronger than during our sea-level take-offs, the ship still walked into the air in 13 seconds.

After flying abeam the Muroc Air Force experimental station and in over the Mt. Wilson observatory, we let-down into the ever-present layer of haze now so common in Southern California. Before we entered the busy traffic pattern at East Los Angeles, we slowed the new Cessna to a minimum, dropped full flaps and then snapped the flaps up quickly. There was no tendency for the ship to settle. It merely changed attitude by dropping its tail a little.

Forward visibility is ideal with flaps down since the ship flies even more nose-low. Rearward visibility, however, is somewhat restricted since the pilot can not see directly behind him through the flaps.

We flew the complete traffic pattern between 45 and 50 mph, loafing along behind the trainers that were putt-putting around in landing practice. Our final approach was at 45 mph and the little ship still has enough excess speed for a normal flare-out before landing.

When we taxied up to the gas pit, the Doctor had a big grin all over his face. "That was sure fun," he said. "You know, I think that I'll get my pilot's physical renewed and check out in that ship for a little flying of my own."

From a performance standpoint, the metal-winged 140 seems to fly both a little faster and a little slower than it's fabric-covered predecessor. The stalling-speed characteristics are markedly improved and the top speed has been upped enough for Cessna to add 5 mph to the advertised cruising speed of the 140.

For a fully complete two-placer, it will be difficult to beat the new Cessna. Maintenance-wise, the ship should prove to be a miserly spendthrift with its all-metal constructions, foolproof gear and easily-accessible engine. From a pilot's standpoint, it flies with a minimum of guidance.

What more can you ask? Cost?—Well—the 85-hp Cessna sells for $3495, and the 90-hp for $3695—fly away.

Plane Care for Flight

(Continued from page 46)

getting full take-off power.

Tex tells a good story about the importance of pre-flight checks. When he was at Randolph in mech training 13 years ago, he went riding in a PT-13 with a pilot who never bothered to check the oil cap. Sure enough, once in the air, oil poured out of the tank, covered the windshield until it was impossible to see through it. At this point the pilot stuck his head outside—and promptly blinded himself in a deluge of oil.

Tex, who was not a pilot then but who had accumulated stick time, took over and flew for 10 minutes while the pilot rubbed the oil out of his eyes in time to make a dead-stick landing with the engine out.

Besides the raw nerve ends that might have been frayed in the case of any passenger except Tex, the United States Army lost the service of that engine. It had eventually konked out for the want of lubrication oil, all for the want of a little oil cap which, in turn, was missing for the want of a pre-flight check.

On the other hand I know a pilot who did religiously check his own oil and gas tank and who put his tank caps on personally. And then one time took off with the cap to his gas tank bulging out of his pocket.

I guess sometimes you can't win.

Editor's Note: The tragic death of Capt. Bill Odom in the Thompson Trophy Race at Cleveland on Labor Day brings to a close the series of articles Bill was preparing for SKYWAYS' readers. Flying Jacqueline Cochran's Mustang, *the "Beguine," Bill is thought to have blacked out in a pylon turn, his ship went into a high-speed stall and crashed into a house a few miles from the course of the Thompson race. Further tragedy was the fact that Odom's crash also killed a young mother and her small son.*

In losing Bill Odom, airmen everywhere have lost a friend and champion, an able pilot whose first love in aviation was not air racing but the flying you and I do, cross-countries with a purpose, either business or pleasure. Just as you had come to know Bill through his accomplishments in aviation and through his articles in SKYWAYS, so had we come to know him through working with him. He was a pilot's pilot, a fellow who always had time for a hangar session and talk on things aeronautical. It had been his hope to continue the SKYWAYS articles indefinitely . . . it had been our plan that he do so.

Closed-course races have brought death to many able airmen, and we join with others in calling for a revision of that type of racing. Its price is far greater than its value to aviation. We think it's time for a change. Safety is the need.

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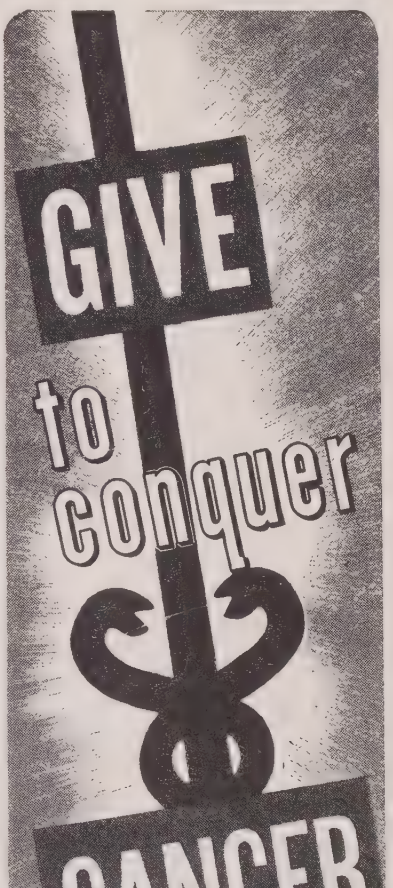

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High-Speed Stalls

(Continued from page 17)

in rugged Stearmans, Ryans and Fairchilds. A part of every Army and Navy student's training was to roll him over on his back, let the airplane "split S" down toward the ground and then snap back quickly on the stick. The trainer would shudder violently and then snap into a spin—while going straight down at better than twice the cruising speed of the airplane. The reason was a high-speed stall.

One obvious reason why so many of the newer crop of pilots are unfamiliar with high-speed stalls lies in the fact that this maneuver is rough on both pilots and aircraft. The average flight school operator doesn't want his airplanes "wrung out" in acrobatics or rough flying—and high-speed stalls can be plenty rough. With the current trend away from spin instruction for student pilots, the CAA is attempting to take flying out of the "superman pilot" era and prove that anyone who can operate a car can drive his own little airplane.

However, the hazard of the stall remains as real as ever. Recent CAA accident reports have changed the "stall-spin" description to merely "stall" because "our more recent experience has shown that practically all accidents so classified occur at an altitude too low for a spin to develop fully and spins are actually the end result of stalls."

Without delving too deeply into the aerodynamics of a stall, here's what actually happens when a wing quits flying. The average airfoil reaches its stalling point at about 14° of incidence. In other words, the wing quits flying when the leading edge is pulled up 14° above the angle of flight. Normally this 14° is reached when the stick comes all the way back on a landing. The same wing can be stalled just as effectively by pulling back on the stick at high speed. Change that angle of attack more than 14° and you're stalled, regardless of the air speed.

A. Harold Bromley, pioneer trans-Pacific pilot and now Chief of the Pilot Division for the Los Angeles Regional CAA office states that "a survey showed that slow speed was, in most cases, associated with a stall. We were amazed when we found a number of pilots ignorant of the fact that an aircraft could be stalled at high speed. It became apparent to us . . . that our increased fatal accident rate could be attributed, to a large extent, to the ignorance of the high-speed stall."

Here's how a high-speed stall works, according to Dr. Leonard M. Greene, President of the Safe Flight Instrument Corp. "Everyone is familiar with the way a scale will fluctuate if you don't stand absolutely still while weighing yourself. Just imagine standing on a scale while inside an airplane in flight. Just as the weight on the scale keeps shifting with the bumps and turns of the airplane, so does the weight of the airplane on its wings. You can see that it is very easy to double or even triple the weight of the airplane in gusty flight conditions or by maneuvering it.

"Assume that an airplane weighing 3,000 pounds encounters a gust which adds a one 'g' acceleration load or that this additional load is obtained in turning or a flare out. This would increase the stalling speed just as if an additional 3,000-pound weight were placed in the baggage compartment.

"Pilots understand fully the effect of 100-pound additional weight in the airplane on their stalling speed. Yet they do not understand how easily this same additional 100-pound load can be obtained from acceleration. For the airplane in this example, 100 pounds corresponds to a 3/100 of a 'g.' This is such a small acceleration that no pilot has a seat sensitive enough to feel it.

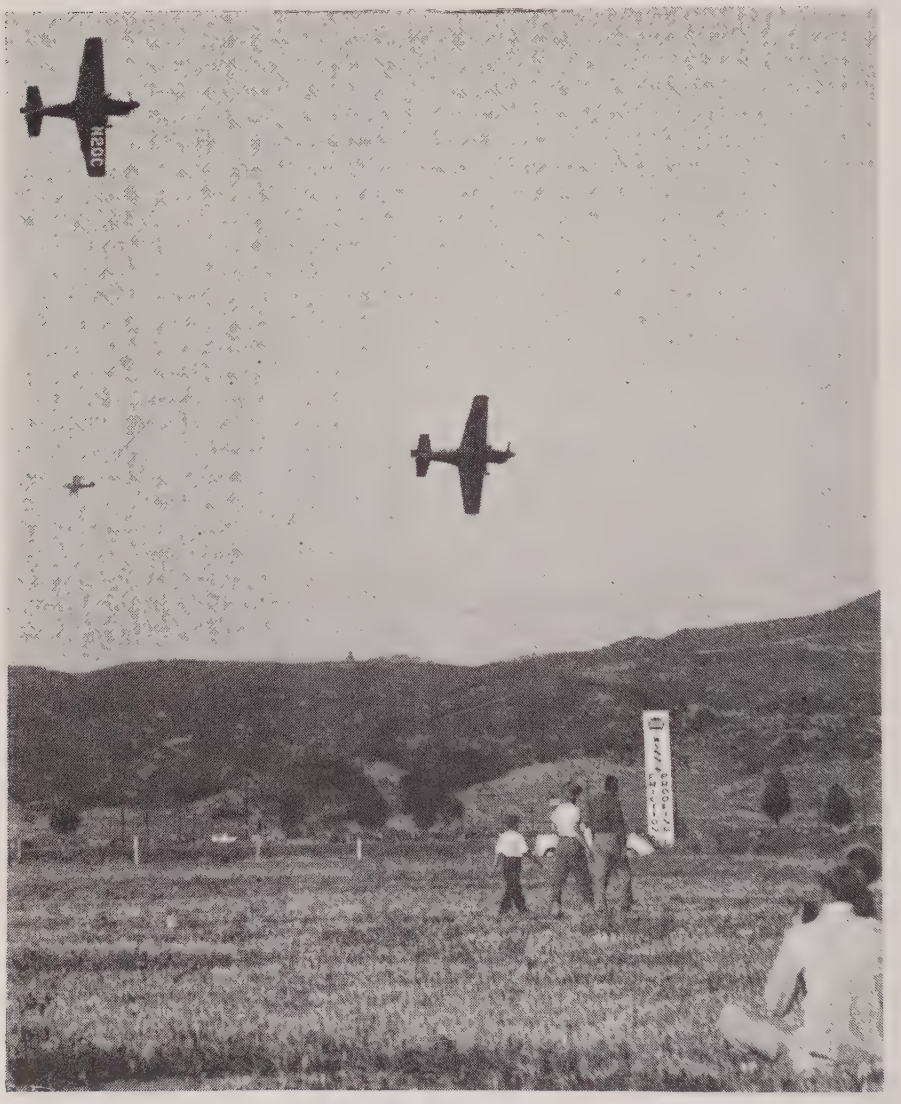
"The 'g' loading actually determines the stalling speed. A '2 g' load requires twice the lift and raises the stalling speed 42 per cent, according to extensive tests. Most pilots think that the stalling speed increases with the angle of bank. Actually, the angle of bank has nothing to do with it. It is only the acceleration or 'g's' that cause the stalling speed to increase. This acceleration can be applied in any degree of bank or with the wings level."

Many a student has been up solo practicing maneuvers and come down with a puzzled expression on his face. He would walk up to his instructor with a story something like this. "I was up practicing Chandelles. After that shallow dive to pick up speed, I started my steep climbing turn. Then something happened and there I was, over on my back trying to figure out how I got there."

Then the flight instructor would go into his description of high-speed stalls. It sounded something like this. "You can turn an airplane only so fast. If you try to turn it from its straight flight path any faster than that, the angle of attack becomes so great that the wing quits flying and you stall out. It doesn't make any difference if you're making a level turn, part of a loop or a flare-out for a landing; when you try to change the flight path of an airplane too quickly, the wing just rebels and stalls out.

"On this Chandelle you're talking about," the instructor would say, "you probably started your climbing turn and then tried to hurry it up a little with some extra back stick. You stalled one wing out and the ship snapped off into the start of a spin."

(Continued on page 62)



PYLON TURNS are the dangerous maneuvers in air racing. It is on these turns that high-speed stalls are most apt to occur. The g's or extra load cause stalling speed to increase

He Who Flies Backwards

(Continued from page 50)

ran out of fuel and had to be ditched.

As a result of these varied and widely separated incidents, General Arnold came up with an old title and a new job, the Flight Engineer.

Prior to the new concept of the Flight Engineer, or as he had been called formerly, the Aerial Engineer, this gentleman's duties had largely been limited to transferring fuel in flight and attending to any mechanical troubles which could be corrected in the air.

But came the change. "The Flight Engineer," said General Arnold, "shall be an important member of the crew of every Very Heavy Bombardment aircraft. He shall be responsible for the mechanical maintenance of the airplanes. In flight, he shall supervise and direct power settings, air speed, altitude and fuel consumption."

Believe me, this was to the Air Force what the Atom bomb was, a short time later, to Hiroshima. This announcement by the number one man in the Air Force was a tradition-shaking proclamation. It meant, in substance, that the operation and adjustment of all engine controls should no longer be the responsibility of the pilot. "This interloper, this fledgling, this Flight Engineer, what does he know about flying?," mumbled many a veteran pilot in gloomy anticipation of the end of his long cherished superior status.

In an effort to forestall this reaction, Arnold ordered that all Flight Engineers should be rated pilots prior to their training in the complexities of cruise control. For a time, this innovation was pushed with all diligence. But not without some interesting results.

Along with a number of other pilots, I was assigned to the B-29 Flight Engineer training program. Needless to say I viewed the prospect with no little apprehension. My attitude was furthered when first I learned that the Flight Engineer's station aboard the B-29 was such that he would be required to face backwards at all time during flight. The fact that this was necessary in order to maintain a visual watch over the engines did not fail to lessen the strangeness of the situation.

Many of my contemporaries were young officers who had just graduated from pilot school. Most of them had entertained ideas of streaking through the air in a P-51. I could understand their disappointment at the thought of spending the duration of the war pushing pencils and adjusting fuel mixtures aboard a "truck." Not a few of them balked and were court martialed. In fact, I visited one barracks at Lowry Field which was filled with these unconverted pilots who had refused to go gallivanting through the sky south-end first. "I'll be damned if I'll fly backwards," was the attitude most commonly expressed by these frustrated flyers.

Added to this was the fact that most of the B-29 pilots looked upon the new Flight Engineers with derision. Whether or not it was resentment upon their part against this strange creature who was usurping their rightful duties, I have never determined. Rather it seemed a case of mutual distrust. The pilots didn't trust the Flight Engineers, the Flight Engineers didn't trust the pilots and in not a few cases neither pilot nor Flight Engineer trusted the airplane. It wasn't long, however, until Arnold's faith in the value of the Flight Engineer began to be confirmed. For me, proof came one day during a simulated long-range flight.

Our instructor, a flight engineer who had seen foreign service during the first disappointing days of the B-29 program, asked us, "Can a bomber fly farther on three engines or four?"

Now this was a question which had always promoted a lot of hangar debate. Most of us had never had the occasion to experiment with three-engine operation as compared with four. Personally, I reasoned that three engines shouldn't burn as much fuel as four. I answered, "Three-engine operation should be most ideal for long-range flight."

"Wrong," came the reply. And to show what he meant, our instructor set up and flew for three hours on all four engines. Meanwhile, we kept track of the fuel flow. Then the pilot cut one engine and we flew for another three hours on three engines. Again, we recorded the total gasoline used.

At the end of the flight, we were convinced. The trim necessary to maintain the airplane in normal flight with one engine inoperative required far more power from the remaining engines than would be used with all four of the powerplants functioning.

The importance of this factor to long-range flight is apparent when we compare total distances which can be flown under varying conditions. If forced to fly a great distance on four of its six engines, for instance, the monstrous B-36 might conceivably reduce its range by 500 miles or more. Obviously, the trick is to keep all engines functioning at maximum efficiency. This is where the man who flies backwards takes over.

Gone are the days when the overworked pilot must attend to fuel consumption and engine operation in addition to controlling air speed, altitude, direction and attitude. Today, the precise weight of the airplane, the location of crewmen, the changing balance induced by emptying gasoline tanks—these and a multitude of other duties are the responsibility of the flight engineer. "Distance, fuel economy!" —those are the words which constantly drone in his ears.

Most indicative, perhaps, of the status now enjoyed by flight engineer personnel in Air Force circles is the final check-out flight he must undergo before he receives his rating.

Assigned to an airplane, the candidate for position of flight engineer is briefed for a 3,000 mile transcontinental hop. He is told that in case of emergency, such as running out of fuel, he can land at one of the auxiliary fields which lie scattered along his course.

Then, while the muscles tighten up in his stomach, he watches as the ground crew loads aboard gasoline for just 2500 miles. If he can stretch that amount of fuel for the full 3,000 miles, he is a flight engineer. If not . . . well, there aren't many auxiliary fields in the Pacific ocean.

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Of SKYWAYS published monthly at New York, N. Y. for October 1, 1949.

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Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. Fred Henry, who, having been duly sworn according to law, deposes and says that he is the publisher of SKYWAYS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, weekly, semiweekly or triweekly newspaper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the act of August 24, 1912, as amended by the acts of March 3, 1933, and July 2, 1946 (section 537, Postal Laws and Regulations), printed on the reverse of this form, to wit:

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(Continued on page 62)

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(Continued from page 61)

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High-Speed Stalls

(Continued from page 58)

The reason for the spin, of course, is that one wing quits flying and the other one is still in business. Right at stalling speed, the slightest change in wing loading—a gust of air or a change in rudder pressure—will cause a wing to stall out. This "roll instability" is the start of a spin, and the rudder is the only control that will make an instant recovery. Adding power helps since the blast of the slipstream makes both the rudder and elevator more effective.

The various gadgets used by aircraft designers to give an airplane good stalling characteristics also help the airplane stay right-side-up in a high-speed stall. Wing-tip slots, stall strips on the leading edge of the wing and "wash-out" or warping the wing tips all help to do the same thing: keep the wing-tip flying until after the center section has stalled. The reason for this is simple. As long as the tips of the wing are providing lift, the airplane will not fall into a spin.

What about the non-spinnable aircraft? Dr. Greene has this to say. "An airplane with restricted elevator control, such as the *Ercoupe* . . . cannot only be high-speed stalled, but they can be low-speed stalled as well. These airplanes are spin resistant or spin proof. That they are stall *proof* is a public misconception."

High-speed stalls are the cause of many a washed-out landing gear, particularly on modern aircraft equipped with effective drag flaps that permit a steep final approach into an airport. The pilot comes in high on his final approach drops full flaps and dives steeply toward the end of the runway with an air speed well above the conventional stalling point. At the very last minute, he snaps back on the control column—and nothing much happens during that brief interval of time when the airplane should be flaring out for a landing. Then—Bang!—an expensive landing gear must be replaced, and the pilot tries to figure out what happened. Had he begun his flare-out a little more gradually, there would have been no trouble.

"Flying is a lazy man's game . . . plan ahead a little and you'll never have to hurry" is an adage as old as the airplane itself. It applies directly to this problem of high-speed stalls since the pilot who plans his maneuvers ahead of time is not forced into the position of trying to curve the flight path of the airplane sharper than the airplane will turn.

A great deal of research has been done recently on high-speed stalls by members of the Professional Race Pilots Assn. Almost without exception, the closed-course air-race accidents, barring structural or mechanical failure, have been caused by high-speed stalls. While attempting to "hurry" a turn around a racing pylon, even an experienced pilot is flying on the ragged edge of a high-speed stall.

Crack Lockheed Designer, Irv Culver, who was in charge of the basic planning for the prize-winning "Cosmic Winds" in the Goodyear race, says that "things happen so much faster in a high-speed stall than in the conventional straightaway stall

(Continued on page 64)

Dilbert

(Continued from page 36)

verbial barn door. He was strictly an exhibitionist, however, and was in the game solely for the thrills.

While on a local flight one day during a heavy overcast, he got tired bumping around below the clouds and decided to go upstairs. He finally found a small hole and went up through. After tumbling around in the sunshine for awhile, it came time to go home, but there was no hole. With a shrug, our *H. P.* started an instrument let-down between two widely separated peaks which stuck up *through* the overcast. There must be a valley between them!

But there wasn't! Neither he nor his instruments ever saw the peak he hit which only stuck up *into* the overcast.

That, gentlemen, is the picture of a fatalist in action. Why do they always say, "Well, if it's my turn, I'm going to get it anyway?" I'll tell you—just plumb laziness! It takes much less work and effort to assume this attitude than it does to pitch in and get fully qualified in the science of his profession. Lack of knowledge, of course, affects his judgment.

Flying is hazardous for the fatalist. Aviation is a science, based on the laws of cause and effect. You can't get by on guesswork; you've got to *know*. Those who don't, eventually come to grief.

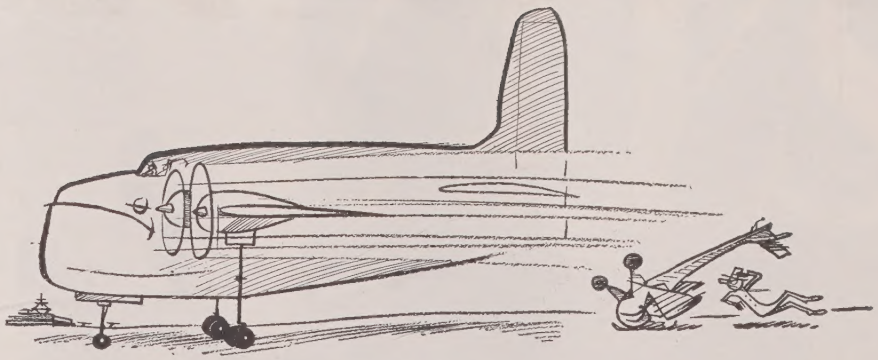
Not Good To The Last Drop—After having used all his gas but the reserve, Dilbert decided he had better come in and land. He contacted the tower, advised that he was on reserve, and requested permission to land.

The tower acknowledged, but told him to circle until two planes which had been given clearance, took off. The first plane took off immediately, but the second one evidently had trouble. Dilbert again requested permission to land, but was told to continue circling.

Shortly after this, the second plane took off and Dilbert was given landing clearance. He ran out of gas before he reached the runway, however, and turned over in a sugar-beet field. The gas gauge still read 5 gallons when the engine stopped.

For my money, the tower was largely responsible for this accident. Their casual attitude in this case was *not* commendable.

Errors of other personnel are poor comfort to a crashed pilot, however. He must always look out for his own safety. As a matter of fact, this emergency was entirely pilot-caused. Dilbert should have returned to the field before his gas was almost gone. He also should have known that with his gas so low, his engine might quit at any moment. Realizing this, he should have protected himself by getting more altitude and staying close enough to the field to be able to glide in from any position.



Don't get caught in the swingin' door of a twin-engine airplane's slipstream!

Slipstream Sense—While taxiing out to take-off position, a pilot needlessly exposed his trainer to the take-off slipstream of a large airplane. He immediately applied more throttle and brake. This brought him parallel to the big plane, heading in the opposite direction. In this position, however, the slipstream got under his tail and nosed him over.

Certainly everybody has been warned to avoid slipstreams, both on the ground and in the air. This accident aptly gives warning on another point. If you should get caught in a powerful slipstream *while taxiing*, don't fight it. Cut your throttle and allow your plane to swing into it, with minimum use of brakes.

Prop Twist—What would you say caused these two accidents, both in high-powered, single-engine jobs? In the first case, the pilot bounced almost 50 feet after a hard landing. At the top of the bounce, he applied full throttle. The airplane immediately did a half-roll to the left and hit on its back.

In the other case, the pilot was slow in his landing approach and his left wing dropped. When he found he couldn't raise the wing, he used full throttle in an effort to regain control. This airplane also flipped over on its back.

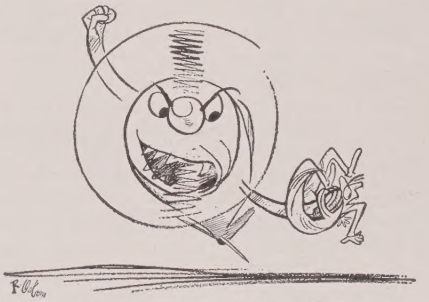
Very evidently, both these accidents were caused by Old Man Torque. In case you've forgotten, propeller torque is the turning momentum produced by the rotation of the prop. It always acts opposite to the direction of rotation, therefore always pulls the plane to the left. In high-powered airplanes there is also a marked tendency for the plane to roll to the left.

Believe me, your ailerons do not receive sufficient air pressure at low speed to counteract the tremendous left torque which is generated when full throttle is suddenly applied to a high-power engine. Convince yourself of this by trying it at *safe* altitude. While still up there, check just how much torque (sudden throttle) you can handle at low speed.

To prevent this type accident: First, Don't let that left wing get down when near stalling speed. I admit this is rather gratuitous advice, but it seems necessary—stalls and spins continue to be among the most costly of all aviation accidents.

Second: When near a stall in a high-powered plane, do not apply throttle suddenly; instead, *anticipate* the stall and apply throttle gradually. If you haven't time to ease it on gradually, better not use any. Do the best you can with what you have, and accept a hard landing or a minor accident, if necessary, rather than a possible more serious accident, such as these two pilots experienced.

Remember, control is the quintessence (yes, quintessence) of airmanship. If you can't control your airplane at all times, you'd better go back to flying small balsa models.



There's a twist to flying called torque

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GOODYEAR TROPHY winner in this year's Goodyear Races was Bill Brennand from Oshkosh, Wisconsin. Flying one of Steve Wittman's midget racers, Bill established a new course record of 177.34 mph in winning the trophy. Young Mr. Brennand won the Goodyear Trophy last year, and plans to fly the Goodyear Races again next year for third triumph

High-Speed Stalls

(Continued from page 62)

normally taught to beginners. It takes time for the flow of air over a wing to break down and cause a stall, but the forces are so much higher in an accelerated stall that the time element is much shorter. Actually, the same things happen in the garden-variety one 'g' stall, but they take place so quickly in a high-speed stall that the pilot often doesn't know just what is going on.

"Stall characteristics are not the same on identical airplanes carrying different loads," continued Culver. "An overload in the rear baggage compartment of a plane will change the center of gravity and make the airplane more unstable. Quick and violent stalls may follow. For that reason, private pilots should be aware of the baggage limits of their planes and not try to cram those extra heavy suitcases in the plane just because they may have enough room. Designers can't very well put the baggage compartment in the nose of a little plane since an extremely nose-heavy ship won't flare-out on a landing. Airliners get around this problem of changes in balance by using more tail area at a small sacrifice in performance."

A high-speed stall is one of the most violent maneuvers that can be done to an airplane. Airframe loads can be pushed to the danger zone by sudden application of elevator control. A snap-roll, for instance, is the result of a high-speed stall with a touch of rudder added to make the plane roll in the desired direction. The violent buffeting in a so-called "secondary stall" at the bottom of a poor spin recovery is this same high-speed stall in which the pilot tries to pull out too fast from the dive following his original spin recovery. Practice and demonstration of high-speed stalls comes under the heading of acrobatics and any seasoned instructor or flight school will recommend parachutes.

Commercial pilots with over a thousand hours are the worst stall-spin accident risks, according to CAA surveys, because they fly closer to the edge of a stall with their greater experience. Likewise, 200-hour private pilots are more prone to stall accidentally than less experienced pilots. Statistics show that 9 out of 10 of these mishaps are the direct result of pilot error or ignorance.

Actually there is no distinct point where a stall becomes a high-speed stall any more than one could say where warm becomes hot. Yet a survey conducted by the Safe Flight Instrument Corp. showed that almost all the warnings against inadvertent stalls were recorded during accelerated flight with air speeds well above the conventional "stalling speed" of the airplane.

"I never heard of a high-speed stall until I took my commercial written exam, though I had been told to open up the throttle in steep turns, 'to keep the nose from dropping'," says Ruth Petrie, executive assistant of the Crash Injury Research unit of Cornell University.

Why such skimpy instruction on such a basic phase of flying? Is it because flight instructors themselves aren't too sharp on just what happens or is it too much work to get the point across to a green student? Is it because over-energetic manufacturers are so intent on selling flying to the public as a completely fool-proof means of travel that they gloss-over the potential of a high-speed stall? Is it because flig school operators don't want their equ ment abused in the instruction of t violent maneuver?

Whatever the cause, a pilot should ha the same basic knowledge of high-spe stalls that the really proficient automob driver has about a car in a skid. In b respects, knowledge will keep him out trouble.

One very practical application of hig speed stalls is practiced daily by cr dusting pilots throughout the country. seems that nearly every dusting assig ment includes at least one inaccessa corner, bordered by high-tension lines trees, where dust should be spread. T only way duster pilots in convention aircraft have found for powdering the hard-to-get-at corners is with a high-spe stall. The pilots fly toward the corner zero elevation, then start a gradual pull- so that the plane's line of flight is ov the obstacle. Then the duster pilot sna back on the stick, deliberately putti his plane into a high-speed stall. Excessi buffeting helps spread an overload of d in a minimum of time while the nose- angle of the plane causes the propwa to distribute the dust over the enclos area. Since the flight path of the plane w originally established to clear the obstac there is theoretically no chance collision.

One recent development, the stall war ing indicator, had helped materially cut insurance rates for personal aircra This gadget works on the proven theo that a "stagnation point" is located the leading edge of every airfoil whe the air passing above and below the wi is separated. The vane of the "safe flig indicator" is mounted slightly below t normal stagnation point so that the defle tor remains down-and-off under all sa flight conditions. When speed, acceleratio loading or turbulence change sufficiently bring the wing near the stalling point, t reversal in air flow past the detector clos an electric circuit which makes a war ing light and horn go on in the cabi thus warning the pilot.

This vane-type stall warning devi works during all stalls, high-speed or t garden variety, up to the speed of soun In spite of the original objections of t old-time seat-of-the-pants pilots, the safe record of stall-warning equipped a planes has been markedly higher tha non-equipped planes. Stall-warning ind cators are now contemplated for sever yet-secret military aircraft.

The whole problem of high-speed sta boils down to the simple but not we known fact that you can curve the flig path of an airplane only *so* sharply. Wh a pilot exceeds these limits, he's argui with some of the best established law of aerodynamics—and he's also heade for trouble.

To avoid these high-speed stalls, exce for experimental purposes at high al tudes, a pilot should plan his flight f enough ahead so that he need make extreme last-minute changes in flight pat

A high-speed stall is similar to lockin the brakes on an auto in the middle of turn. When that stick is pulled back t far, you're all through flying—no matt where you may be!